BETTER FRUIT

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Special Information About Pruning and Shaping Young Trees Pruning for Fruit Every Year

Engraved by Hicks-Chatten Company Portland, Oregon

The Spitzenberg is universally conceded to be one of the best eating apples grown, having a distinct spicy flavor and being very juicy, and is a beautiful red in color. The Spitzenberg is usually at its best during the months of October, November, December and January; however, it can be kept in good condition in cold storage much longer. For richness of flavor cooked it has no superior. It is grown extensively in the Northwest.

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BETTER FRUIT

AN ILLUSTRATED MAGAZINE PUBLISHED MONTHLY IN THE INTEREST OF MODERN, PROGRESSIVE FRUIT GROWING AND MARKETING

The History of the Apple

Hon. Curtis Guild, of Boston, Massachusetts, before National Apple Shippers' Convention, 1914

ACCORING to Boston's own history of itself, the first apple tree planted west of the Atlantic was planted within the city limits of the City of Boston, on Governor's Island. The land was assigned by the General Court of the colony to Governor Winthrop, the first governor of Massachusetts, on the special condition that he should plant it with an orchard of apple trees, and also—shades of the prohibition Puritans look down upon us—with a vineyard, that the new colony might not be lacking for intoxicating stimulats. You may be interested to learn the exact language of the act: "On the 3d of April, 1632, at a Court of Assistance, the island called Conant's Island, with all the liberties and privileges of fishing and fowling, was demised to John Winthrop, Esq., the present governor; and it was further agreed that the said John Winthrop did covenant and promise to plant a vineyard and an orchard on the same, and that the heirs and assigns of the said John Winthrop for one and twenty years pay yearly to the governor the fifth part of all such fruits and growth as shall be yearly raised out of the same, the lease to be renewed from time to time by the heirs and assigns of said John Winthrop, and the name of the said island is changed and it is to be called The Governor's Garden." The name has since changed to Governor's Island. It seems the governor carried out his pledge and did plant the apple trees, though he seems to have made rather a failure in regard to vines.

The vineyard, it is to be feared, failed, but as a matter of fact the yearly dole of apples amounted to two bushels, which were handed over every year, not to the taxpayers but to the legislators who, in those wicked days of graft, openly consumed this property of the people during the sessions of the General Court of Massachusetts. In other words, the legislators, and not the people, received that magnificent income of the commonwealth.

To go back from the origin of apple culture in the United States to the origin of apple culture in the world is perhaps the longest step that any man was ever asked to take, for it would be necessary, almost, to go back to the time of the pterodactyls and dinosaurs to arrive at the blossoming of the first apple tree. One of the most interesting ways to study history is through etymology, through the most enduring of monuments, human speech, which carries down in every word we speak some remote fact of history, even in prehistoric times. Apples and pears have been found with relics of the stone age. Apples and pears, dried or preserved or petrified, have been found among the relics of the Swiss lake dwellers, who formerly lived, as you remember, on large platforms built on piles over the large lakes of Northern Switzerland. Apples and pears go back to the very beginning of civilization as does the oldest of known vegetables, asparagus, the name of which, of course, is Greek, meaning simply "sprouts," probably the first vegetable known to man. The Chinese, you will remember, cook bamboo sprouts today.

Features of this Issue

Now the word "pear" is of Greek origin. But the origin of the word "apple" is lost in mystery. Nobody knows who first invented the name, what its original significance was or what it means. We only know that "apple" is found in the German language as well as in the English language, and also, in a slightly changed form, yabloco, is found in the Russian language. The more familiar Latin name is pomum. It really doesn't mean apple; it means fruit.

In seeking to discover what were the earliest fruits known to men we find that many of the more common fruits have no remote ancestry, but appeared in comparatively modern times. For example, you will find no mention in the Bible of the word "pear" or the word "plum," which is a corruption of "prune." Prunum is the original form and plum was corrupted from prunum. You will find no mention of the word "peach" in the Bible in either sense of that much abused word. You will find no mention there even of dates, which is very peculiar, as the Jews were very close to the Arabs and one might have supposed they would have been familiar at least with the fruit of the palm tree, but you can search your concordance through and you will find none of those fruits mentioned. In the times of the Old Testament, the Jewish people were in the enjoyment of grapes, which by the way is not the proper name of the fruit, grape simply meaning a cluster. Melons were also known to the Jewish people; so were pomegranates, meaning apples with seeds in them; so were apples—apples themselves. Of course you will remember a dozen familiar quotations in the Bible referring to apples: "Apples of gold in pictures of silver," and all sorts of references to the sweet scent of the apple and its curative properties: "Comfort me with apples for I am sick with love," and so on. Not merely among the Swiss lake dwellers, therefore, but among the Jews for hundreds of years before the coming of the Saviour the apple was a well known and much appreciated fruit.

As I said a moment ago, the most durable monument is human speech. For example, very few people who eat cantaloupes, at this delightful season of the year, know the origin of that name or where that kind of melon arose. The name tells every time you utter it. It came from a small village in Italy, Cantaloupa, where they were first raised, and in similar fashion cherries commemorate their Asiatic origin. They were not known in the days of the Bible, but were known to the Greeks and the Romans, and were originally produced and raised in and about the town of Kerasos in Asia Minor. The name plum comes from the Greek. The orange is a Persian fruit. There is only one nation in the world today that gives to the orange its original name, the Spanish. In the Spanish language the word is naranja. Naranja is a Persian name given to the orange, which originated in that nation. The peach also came from Persia. The name in Latin, persicum, means simply the Persian fruit. Nectarines were named from nectar, the food of the Gods of Olympus, being the kind of peach that was supposed most nearly to approach in taste that divine diet. Apricots—I scarcely suppose any of you would connect apricots with the word precocious, but the apricot was so called because in the early times and today it comes on the market earlier than the peach or the plum.

The apple, as I have told you, in the English language and the German language, has been given that name for such an enormous period of time, long

before any language was reduced to writing, that no one knows what was the origin of the word in that form. The Latin language had two names for it, pomum and malum. You will find malum very little used in any modern language, although melon is another form of it, meaning a large round fruit like an apple, but pomum originally applying to all fruit became more particularly applied to the apple because then, as now, it was esteemed the most valuable and healthful fruit given to man.

From that word pomum eame all kinds of queer words whose origin you would searcely associate with it. For example, a word nobody would ever associate with apples is pomade, as used in any barber shop. Yet pomade had its origin in your special and favorite fruit, the apple, because in classic times the Greek and Roman ladies used to dress their hair with pomade. Of eourse ladies never use that sort of thing today. Well, in those days the fashionable feminine hair dressers did use pomade, and it has been ealled pomade ever since because one favorite dressing for the hair and face was juice extraeted from the apple, with eertain other ingredients. In similar fashion are derived from the Latin name for apple the pommel of a sword and the pommel of a saddle, the round objeet whieh rises up on the saddle, and the apple-shaped ball at the extremity of the old-fashioned sword hilt. The word pummeling comes not from the apple itself but from the pommel of a sword. It originally meant to strike a man in the face with the pommel of a sword instead of slashing him with the blade. Thus, you see, in more senses than one, the apple has been at the root of discord from the days of antiquity 'til now.

Another use of the word apple is familiar to you through the old English word for tomato, "love apple." Did you ever happen to hear the reason why tomatoes a hundred years ago in New England, in fact all over the country and in old England as well, were called love apples? Some old-fashioned people, like myself, can remember the time when our mothers always called tomatoes love apples. They were cultivated as garden plants in Old and New England because the fruit was beautiful, and for years many people thought the fruit unwholesome. It was a Mexican plant in origin and utterly unknown to Europe until after the voyages of Columbus. It is an Aztec plant. The original name for it was tomatl, but the pronunciation of the final "l" was extremely difficult in Spanish mouths; so the Spaniards called it tomato.

Incidentally, of course, the wild fruit was very much smaller than the cultivated fruit is today. There was also a second Spanish name. The Spaniard uses the word "moro" in the same sense that some Americans and Englishmen use the word "nigger," a word which I hate because it is used in a derogatory sense. Yet you know some sailors of both English speaking nations are in the habit of using that word to mean not merely any black person but any person that is not a white man. In the Far East sailors so designate a Hindu, for instanee, or a Filipino, or any person that is not a Caucasian. In the same way "moro" in the Spanish language means any person that is not a pure-blooded white. The seeond Spanish name of the tomato was "the apple of the moor," or, translated into English slang (I apologize for the use of the word) "nigger apple." Very well, there is a word in French which very mueh resembles moro, but has a very different and mueh more charming meaning, "amour," and the Freneh, hearing the name of this new fruit as apples "de moro," thought it was apples "d'amour," and eonsequently called the fruit "pomme d'amour," apples of love, which the English translated into love apples, an old name which has continued in the baek country distriets down to this very day, suggesting that if apples are active in promoting discord they also may promote love.

There are many other stories conneeted with the apple from the very dawn of history. Of eourse the most familiar apple story is of the origin of the raee in the first ehapter of the Old Testament, the story of Adam and Eve, where the apple is mentioned as a temptation, not merely on aecount of its, shall I say magieal powers, but also because of its attractions as a delicaey.

In similar fashion story after story in Greek mythology rests on the apple. You will remember the partieular one of the apple of discord to whieh I have already referred. With names ehanged a little it is exactly like those old German house stories. "hausmarchen," as they are called, which were collected by the brothers Grimm, where at some splendid wedding of a prince and princess the wicked fairy comes in and spoils the entire happiness of the occasion, but incidentally does some service by furnishing the plot of the story. Thus at the marriage of Thetis and Peleus the goddess Discord arrived, not having been invited to the feast, and presented as a wedding gift a golden apple on which was inscribed, "For the most beautiful," and the three goddesses, Minerva, Juno, the wife of Jupiter and Queen of the goddesses, and Venus, competed as to which was the most beautiful. Even in those days bribery of voters apparently seems to have been known. Paris, you will remember, the Prince of Troy, was established as the umpire, and after they were through everybody wanted to kill the umpire in the good old style of the fans. Each goddess offered Paris a gift if he would give her the apple, and he finally chose Venus as the most beautiful because she had promised to give him to wife the most beautiful woman in the world. He chose Helen, who was the wife of another gentleman, but apparently that made no difference, and in the attempt to recover Helen the Greeks invaded Troy and the Trojan war came about. So, if the apple lies at the root of all our religion, an apple also lay at the root of remote antiquity's greatest war.

There are many other stories I might relate to you from Greek mythology. You will remember the celebrated foot raee in whieh one Greek woman was even then demanding to be put on a par with man. I don't think she demanded a vote, but she managed to beat all the men that competed with her until she beeame famous as the champion runner. Her name was Atlanta. At last she was beaten, not through man's superior skill but through man's superior guile, for Hippomenes, who competed with her in the raee, carried three beautiful apples in his hand and whenever she was outstripping him he dropped an apple. The woman, in Greek as well as in Jewish history, was too mueh tempted by the apple to follow the straight and narrow eourse, and every time he dropped an apple she stopped to seize it. Thus Hippomenes won. After the race he took a terrible risk and married Atlanta, whom he had defeated; so she met her match in both senses at the same time.

Another story coneerns the Hesperides, onee supposed to be fabulous, but now believed to be the actual continent of Atlantis and whieh some arehaeologists have re-establshed in the middle of the Atlantic Ocean. The golden apples of the Hesperides, those western islands in the Greek legends, the great source of civilization where all was peaee and comfort and happiness, sometimes called the Islands of the Blessed, were said to lie off the Portuguese coast to the west of what are now the Azores. The Aztees of America had a tradition of a similar abode of the gods lying in the same place. The deep-sea dredgings of His Majesty's ship Challenger have shown that the ocean bottom at that place is a great table land, rising sharply from the lower depths nearly to the surface and covered with signs of volcanic eruptions. It is more than possible, therefore, that this continent did exist and was destroyed by voleanic eruptions and earthquakes, as we have seen smaller islands destroyed in our day.

On these Hesperides, these so-called fabled but probably existing islands in the West, there was, according to the story, a wonderful tree of golden apples guarded by a dragon with a hundred heads. The Twelfth Labor laid upon Hereules, the demigod of classic mythology, was to go forth and slay this hundred-headed dragon and to bring back some of these golden apples. He reached the island, killed the dragon and returned with the apples.

Greek and Oriental mythology and mystery are not, however, the only places where the apple has been so honored as the emblem of health. In like manner our American "superstition" with the old verse, handed down from England, "An apple a day keeps the doctor away," has an origin in no superstition at all. The use of the apple does promote health and the modern medical fact is recorded in the mythology of all kinds of nations all over

the world. In the stories of the Arabs, in the stories of the Persians, the apple always appeared as a life-bringing, as a health-giving medium; even in the old poems and songs of the Scandinavians of Northern Europe the apple appears in the same light. It was by constantly partaking of the indestructible apple of Idun that the Gods in Valhalla retained their immortality.

In historic times the crabapple, so called on account of its sour, biting taste, like the nip of a crab, was found all over Europe. It was first brought to America, as I have told you, but the real origin as far as the historians can discover was exactly where the Bible puts it, that is to say, the first apple trees were probably found somewhere in that district back of Palestine and Asia Minor, in a rough way toward Messopotamia, where the Paradise of the Bible, as you remember, was located. Thence they were slowly spread over Europe, being taken out first, of course, by the Pelasgians, Greeks and Romans and by them extended through Europe. The Romans first brought the cultivated apple to Britain. Still the typical English apple has a French name, and therefore must have been brought in by the Normans after their invasion. The English "pippin" comes from an old French word, pépin, which means a seedling. From England the Puritan forefathers of New England brought their favorite fruit to these shores, and thence the apple steadily traveled west.

It is very interesting to remember that the birthplace of the apple tree is also the birthplace of the Caucasian race, and that wherever the white man has moved west on his trip around the world, to Greece, to Rome, to Northern Europe, to England, to the United States, he carried the apple tree with him. The apple tree, in its march through civilization, typifies the advance of the white race, its original friends in its native home. Once in America, it crossed the Allegheny Mountains with the pioneers. I wonder how many of you in Ohio, in Indiana and in Illinois have read the story of Johnnie Appleseed, the crazy man of the colonial days, who traveled about with a piece of sacking as his only clothing, bare footed, respected by the Indians, who regarded him, being insane, as one stricken by the Great Manitou above and let him pass safely. Wherever he went, he planted apple seeds all through the Middle West, and the first crop of apples grew up wild and without cultivation. Crossing the Mississippi River, the apple went with the Mormons into Utah, where some of the most splendid apples raised in the world are grown today. Thence it spread to California, Oregon and the Pacific Coast, and at last, as our American white soldiers crossed the Pacific Ocean to the Philippines and joined the West to the East, so the apple tree has sent its fruit across the Pacific Ocean from the West to the East and American apples raised in the most western country in the world are now being exported to Asia, returning to their ancient home—the apple tree, with the white race, having completed its march around the world.

You have been very patient, gentlemen, in listening to this somewhat rambling and I fear rather uninteresting and desultory talk. I thank you very much for your kindly reception. In these days of terror and horror and bloodshed across the seas, which cannot but have their effect also upon our own country, I can only give you as a sentiment today, one of those old songs that used to be sung in other and happier days, centuries ago, before free trade had ruined English agriculture and horticulture, and when the farm laborer in the old country as well as in New England lived a happy and contented life. Do you know the old song, "Speed the Plow":

Let the wealthy and great,
Seek splendor and state;
I envy them not, I declare it.
I grow my own lamb,
My chickens and ham;
I shear my own wool,
And I wear it.
I have birds, I have bowers,
I have fruits, I have flowers,
The lark is my morning alarmer.
So my jolly boys, now
Sing "God speed the plow";
Long life and success to the farmer!

Observations Upon the Stems of Apples

By Maurice A. Blake

THE stems of apples receive comparatively little attention from fruitgrowers and horticulturists except in identification of varieties, packing of fruit and in judging fruit exhibitions. But in all of these instances the form and length of the stems is of considerable importance. Certain varieties are more or less distinct from others because of the extra length of the stems of the fruits. Rome Beauty, for example, has a characteristically long, slender stem, while Roxbury Russet and the Newtown Pippin have short stems. In the packing of fruit in boxes, the short-stemmed apples are more desirable than long-stemmed ones, as it greatly lessens the danger of stem bruises or punctures, and in some cases it is almost impossible to prevent some stem bruises in the packing of such varieties as Rome. It is in the judging of fruit, however, that differences of opinion in regard to the proper form and length of stem for any variety arises. The term "form" appears upon nearly every score card designed for the judging of apples. And this term, as interpreted by most judges, includes the shape and length of the stem and the form and depth of the cavity and basin of an apple, as well as its general outline. In fact variations in the stems of apples of any single variety are more or less associated with variations in the form of the cavity and sometimes of the whole apple itself.

FIGURE 1—Apple Cluster from Baldwin Tree. Central apple with short, thick stem.

Most judges will agree that an apple receiving a perfect score for form should be one that is exactly typical in shape for the variety. It is then only a matter of deciding what is the true form of each variety in order to secure uniformity in judging. This is where difficulty often arises, however, because there is considerable variation within the variety, and this variation is not confined to the apple as a whole, but also extends to the stems. The Baldwin, for example, may have a short, thick stem and a narrow, abrupt cavity in some cases, and a long stem with a much wider and less abrupt cavity in other specimens. This variation is also quite common with Tompkins King and some other varieties.

If we are to judge the form of an apple, including the character and length of stem, according to the true botanical type for the variety the question then arises, why do we have Baldwin apples with different types and lengths of stems, what causes the variation and which is the normal type? Observations of a number of varieties of apples growing at the New Jersey Agricultural Experiment Station in July, 1914, revealed the following:

FIGURE 2—Cluster of King Apples at the tip of a long twig hanging downward. Apple at left with short stem was fully exposed to light, while the three apples at right with long stems were on the side of the cluster facing the tree.

FIGURE 3—A Cluster of Baldwin Apples in which the central fruit failed to develop properly. Note uniform length of stems of other four apples.

Wherever five apples had set in a single cluster upon Baldwin the center apple of the cluster, or the one directly opposite the end of the spur upon which the cluster was borne, invariably had a short, thick stem. In some cases the stem was even decidedly lipped as illustrated in Figure 1. The apples surrounding the central one of a cluster always had longer and more slender stems than that specimen.

A further study of the matter shows that this behavior is not unusual. A normal fruit bud upon the apple commonly develops five flowers and the central one of these, if uninjured, blooms and sets fruit in advance of the others. If conditions continue to be favorable this fruit will be the largest one in the cluster for some time. The foliage and flowers of the higher forms of plants are arranged so as to secure the greatest possible exposure to light. In the family Umbelliferæ the stems of each individual umbel making up an entire flower is of such length that all the flowers are in the same plane. This means that the stems of the marginal umbels must be the longer.

In some varieties of apples there seems to be an attempt to have all the apples of a cluster in the same plane, and this requires the apples surrounding the central one to have longer stems, as illustrated in Figure 1. It is evident, too, that in a cluster of apples hanging downward on a slender twig

FIGURE 4—Cluster of King Apples. Central apple of different form than the other three.

that one or more apples will be located toward the trunk or center of the tree, while others will be on the side of the cluster fully exposed to the light. It might be expected then that the apples located on the side of cluster facing the center of the tree would have somewhat longer stems than those on the fully exposed side, and this is often the case, as shown by the illustration, Figure 2. When the central apple of a cluster fails to set the remaining apples have stems of a more uniform length, as illustrated in Figure 3. With some varieties of strawberries such as Wm. Belt the first fruit of a cluster to set and ripen, or the "king berry" as it is sometimes called, is distinctly different in form from the other berries of the cluster. And this is true of some varieties of apples in a more limited degree. It can be noticed in Figure 4 that the central apple of the cluster is more roundish oblong and less roundish conic than the others. Again, in Figure 5 the central Barry apple is much less ribbed than the others.

The form of an apple, including the length and thickness of the stem, is determined to a considerable extent by

FIGURE 5—Cluster of Barry Apples. Central apple not as distinctly ribbed as other two.

its location upon the spur and upon the tree. This applies particularly to such as Baldwin, King, Chenango, Barry, King David, and undoubtedly to other varieties not observed by the writer. Gravenstein, Smith Cider, Rome and Ben Davis, however, show a much greater degree of uniformity of stem. In some seasons such varieties as Baldwin would have a larger proportion of short or long-stemmed apples, depending upon the weather, or according to whether the central apple of a cluster set and persisted or failed to do so. Botanically the short-stemmed Baldwin or King, as grown in New Jersey, is just as typical as the long-stemmed specimens and vice versa, so if we judge apples upon that basis it would seem that a somewhat liberal score for form should be allowed in judging such varieties.

Demand for Orchardists

Trained orchardists are in great demand in Oregon and in other states. Of twenty-one graduates in horticulture at the Oregon Agricultural College last year five are members of the college staff, one is assistant at the Southern Oregon experiment station, two are in-

FIGURE 6—Chenango Apple Cluster. Note the short stem of the central apple.

structors in Eastern universities, one is school landscape gardener of Alameda County, California, four are managers of departments in large commercial orchards, three are graduate students at the Oregon Agricultural College, two are managers of the home orchards and three are owners of large orchard and garden tracts. Although attractive salaried positions were offered most of the graduates not thus employed, the positions were declined in the belief that further study or working for themselves is more profitable than working for salaries.

Cooking and Serving Apples for Dessert.—It is very gratifying to "Better Fruit" to see the publications and people of the United States in general advocating the value of apples cooked and served in different ways as desserts and putting on a campaign to increase the consumption in this way because in 1912, long before the idea was advanced by any publication or taken up by any organization or the people in general, "Better Fruit" conceived the importance of developing this field for the greater consumption of apples and published a special edition of "Better Fruit" in October, 1912, showing 209 ways of serving the apple as a dessert.

FIGURE 7—Cluster of Yellow Transparent Apples. Note basin and stem of central apple.

The Pruning of Trees Is An Art Rather Than A Science

By Jay L. Reynolds, Horticulturist, Spokane, Washington

THE pruning of fruit trees is an art rather than a science, for the reason that each and every tree is a unit and must be treated as such. No two trees or units are alike, no two units requiring the same treatment. Again, different varieties frequently require different treatment. Therefore, there can be no fixed or scientific rules established which may be followed in doing the work. The result, whether for weal or woe, must depend upon the genius of the individual in charge of the pruning. An orchard may be brought to high efficiency, or its efficiency may be destroyed by proper or improper pruning. There is perhaps no other department of agriculture wherein men differ so much as in this particular line. Indeed, it would be a difficult matter to find two men who agree in every particular in the pruning of a given tree. It is a matter of judgment—of art, if you please. The building of an ideal tree is the making of a picture. It is the putting of your ideal into form, and the reason, perhaps, no two men agree in every particular in the pruning of a given tree is because their ideals are different. We all may be after the same result, but some may not place so much importance upon the formation of the tree as others, hence the difference of opinion.

Why do we prune? The answer is: To make the tree produce better fruit—not more fruit. A fruit tree if left to itself, under normal conditions, will grow thrifty and produce abundantly if never pruned by man, but the fruit will be inferior and of little or no value as fruit. Take the apple for illustration. A natural or seedling apple tree if left to itself will grow prolifically, with innumerable branches, and invariably will produce a great crop of small, gnarly apples which are scarcely fit for cider. Certainly not much use to man. But did you ever stop to think that that tree, according to the wonderful plan of nature, is not growing for man's benefit? Man is not considered in its economy. Its great purpose is to reproduce itself, which it will do abundantly if not pirated by man. If we examine these little apples, we will find they have a tough, pithy pulp or pericarp, within the center of which are plump, well-developed seeds, covered and splendidly protected by hard, bony carpels. Thus you see it is nature's plan for the tree to produce as many seeds as possible which will grow. It stores them away in the little carpel pockets in the core of the apple, beneficently surrounding the whole with stored-up food in the pericarp, which together with the food tucked away in the seed, will keep the germ in the seed moist and nourish it until it can establish its roots in the soil and send up and unfold its leaves to the sunlight and air.

Man, with all his boasted abilities, cannot produce an atom of food for himself. He must pirate it from the vegetable and animal kingdom. In his struggle for existence, and to supply his wants and desires, he discovered that by cutting back the limbs of the apple trees, they would produce larger fruit; that the pericarp of the apple was very much enlarged and improved; that he could make the tree produce apples that were more juicy, of higher flavor and of finer texture—an apple that he could eat with very much healthful enjoyment. The chances are that, at first, the man who purposely pruned an apple tree did not know the why or wherefore of it all, but now we know a little of why we prune it, and the same will practically be true of all fruit trees.

The leaves are the manufacturing department of the plant. The plant food in the soluble elements is gathered from the soil by the plant rootlets, and conveyed in a thin, watery form called sap, up through the white or sap wood in the outer portion of the tree, to the leaves, where, by the effect of sunlight and air, a change takes place. Just what that change is is not definitely known, but the botanist tells us that here the sap is elaborated, whatever that is, by the action of the sunlight and air. Anyway, the leaves filter out the plant food from the water and the water is permitted to pass off into the air. The food thus provided by the leaves is then carried back along the branches and limbs in a mucilaginous form through the cambium layer to all parts of the tree to build up new wood growth as well as the fruit. A high grade of fruit is dependent upon an increase in the supply of sap and the healthfulness of the leaves for size, texture and flavor. Apples get their color from the sunlight and air direct. At least that is the prevailing thought. You can no doubt now see how essential it is to concentrate and increase the supply of sap and direct it into less space for the benefit of the fruit, and also to form the tree in such a manner as to expose the largest possible leaf and fruit surface to light and air.

I will mention three forms in which fruit trees may be trained, and each has its admirers in greater or less numbers, namely: The central-stem form; the double-story form, and the open-center form.

To train a tree with a central stem, with limbs radiating from it, one above another, or in any other form of a tree which has limbs so situated that when the tree is laden with fruit the limbs will close down over each other, thus shutting out the light and a free circulation of air, is but to defeat the very object sought in proper pruning.

The double-story form, or rather a tree having a double head, one above the other, formed by having one or more leaders leading up from the lower or main heading of the tree. The object sought is to increase the fruit surface on a given trunk. Personally, I don't like the looks of the tree; it is only running the fruit up into the air and harder to get, and I question the increased fruit surface, and further, you are pretty apt to get the same result as with the central-stem tree. The limbs closing down over each other.

My ideal tree has an open center, trained in the form of a gohlet. I do not mean that accentuated open top which we see in some of the orchards, but the tree trained or pruned in such a manner that it has from four to six, preferably five main limbs, at the heading of framework of the tree, with branches well directed to fill up all the spaces on the outer parts of the tree, then with secondary branches leading from these main framework limbs upward and to the center. Then you will find that when the tree is laden with fruit the limbs will bend away from each other and the tree will unfold like a flower, exposing the largest possible leaf and fruit surface to the sunlight and air. Never permit a long, slender limb on your trees. Cut off terminal ends so as to make them grow sturdy, then they will hold up their fruit without breaking and without propping.

You can learn much about how to prune your trees if you will but study them when they are loaded with fruit. In fact that is the time to pick out your ideal tree. And, remember, in picking out your ideal tree, you are not raising trees to beautify the landscape. If I am not mistaken, you are endeavoring to raise trees which will deliver the largest return in apple value. Therefore, when pruning your trees, whether they are large or small, endeavor to shape them to that ideal, which with me is one which will produce and hold up without breaking, bracing or propping, the largest measure of extra fancy fruit. And it is not so much a question of quantity as it is of quality. If you once get your ideal tree in your mind you will have no trouble in determining whether to cut this limb off or leave that one on, for the picture in your mind will determine that for you if you are an artist. And if you are not artistic enough to keep your ideal tree in your mind while pruning you will never be a good pruner.

As soon as your trees are planted, cut the top off anywhere from 20 to 30 inches from the ground, preferably about 24 inches. I allow this range of 10 inches, viz., 20 to 30 inches, because it is absolutely essential that the cut be made above a good, well developed, live bud, for, remember, the framework of your tree must form below this point, and if there is no live bud or buds below where you cut the whip off the young tree is liable to die, or if not, it is liable to sprout out at the ground, and if below the graft it will be valueless. If you have a prevailing wind in your locality, always cut to a bud on the windward side of the tree. Keep your young trees free from all such sprouts as are not intended for the heading or framework of the tree. This

can be done when they first start by rubbing them off with the fingers, but if permitted to grow until wood is formed in the sprouts by all means do not pull them off, but cut them off with a sharp knife.

Let all the limbs and leaves grow which form near the top of the tree. The more the better, except that if one limb gets so much of a start that it is hogging all the rest cut it back. The more leaves a young tree can form the greater will be its root system. A tree, like any other plant, cannot form roots and a strong body unless it has leaves to manufacture the food to nourish them, and it is a good root system you should be most interested in the first year. Therefore, let every leaf and limb grow that will grow the first year, except as above mentioned, for a plant cannot form roots without leaves any more than it can form leaves without roots.

I am in favor of low-headed trees for several reasons, but not so low that the lower branches will lie in the dust and dirt when loaded with fruit. I am in favor of a low-headed tree because, first, the branches will shade the trunk of the tree and prevent sunscald, which is a very disastrous effect we are liable to get from the direct rays of the sun in some of the hot, dry districts. Second, the lower you keep your trees the more will you facilitate the pruning, spraying, thinning and the picking of the fruit. The low measure of average expense in the doing of the work will be just in proportion to the amount of it which can be done by men standing upon the ground. And the increased average of expense will depend upon the proportion of the work which must be done upon ladders. The increased cost of cultivation by reason of the disadvantage of low-headed trees is a very insignificant item in orchard expense when everything is considered.

Pruning One-Year-Old Trees.—This is the year when you can gain or lose more time in the life of your orchard than at any other period of its existence. If the trees are started right at this age, and then kept in good form, you need never thereafter do heavy cutting, thereby losing a great growth of wood which ought to be bearing fruit. In the season of 1913 I was called upon to prune some six-year-old trees which had never had proper care, especially in pruning. In these trees fully three-quarters of the growth will have to be taken out before they can be gotten into anything like proper form for good results, and some of them can never be made good trees. The waste of such misdirected growth, if not criminal, is certainly most expensive. All lack of intelligent attention and care, when it comes to orcharding, is expensive and puts the balance away over on the wrong side of the ledger. To me, a fruit tree is a living, breathing creature. And the trees I work upon have almost as close a hold upon me as my own flesh and blood. They will quickly respond to proper care and attention, and you can train them into practically any form you want. They are like children. If neglected, they seem more inclined to go wrong than right. How essential it is, then, that we give them good care.

This is the time, one year after the trees were set out, to commence the framework or heading of your trees. In pruning one of these trees, look at it, but endeavor to see it in your mind's eye, fourteen or fifteen years old, and start your framework to grow to what you want your ideal tree to be when it is fifteen years old. Four well-directed limbs is enough for a heading, but leave five or six if you can. Six will be better, so that if any one of them gets broken off your tree will not be so apt to be thrown out of balance. If you only have three or four limbs, if one of these is destroyed your tree may be ruined forever, unless you understand budding or veneer grafting, in which case you may start a limb where needed, but such limbs are seldom as strong as those growing out naturally on the tree. Lo, but the young tree suffereth much from the hired help, so don't let them get closer than two feet from the tree with cultivating implements. Do the rest of the cultivating around the tree with a hoe. It will pay. So my injunction is, keep a little more growth in your young trees than is actually needed for framework, so that if it meets with an accident it can be overcome without serious loss. I never expect necessarily to bring my trees to my ideal form until they are ready to bear. Then if I find I have any surplus timber, I cut it out and put my tree in trim, well-balanced form for business. If your trees are properly pruned this first year and then kept in good form, you will never need to do heavy cutting, thereby losing a lot of misdirected growth, and your trees will be thrifty and strong and should begin to produce a fine crop when four to five years old.

In pruning young trees, always avoid bad crotches. If there are two limbs growing upward of about equal size, if you try to save both, you will have a bad crotch. Make your tree out of the best one and cut the other off close up to the trunk. If you have a tree with one strong, upright shoot with weak, stunted limbs only on one side, top the shoot off, make your tree of it and remove the stunted limbs. According to my experience and observation it is a mistake to have Tom-Dick-and-Harry in charge of the pruning of an orchard of young trees, for, if the pruner does not have the future of these young trees at heart, he will not—he cannot—give them the care and attention they should have.

In the rejuvenating of old orchards, which have been more or less neglected and permitted to grow up into the air so that an airship is needed to get the fruit out of them, is the place for the artistic orchard man to show his genius. It may take three or four years to get these old trees into anything like good form, but if they are of good variety it is worth the effort. Invariably, in attempting to re-form these old trees, the orchardist is afraid to cut for fear he is going to spoil the tree. If he feels that way about it he had better keep out. He should know "what" he is doing, "why" he is doing it and "what the result" will be and then go ahead, regardless of how devastating the work may appear to others. If an apple tree is vigorous and thrifty it is a splendid fighter. If heavily pruned it will immediately proceed to throw out new limbs from bottom to top in an endeavor to obtain a leaf surface which will balance its root system. By taking advantage of this new growth you can build practically a new tree on the old trunk by selecting and directing new limbs. It is not so much a question of the size of a limb you cut off as it is the question of what you leave just below where you cut the limb off. In taking the high tops out of these old trees, I would not hesitate to cut off a limb ten inches in diameter, provided there is just below where I cut it off a good-sized limb with plenty of branches to it. Never cut a limb off leaving a bare stub. It will die from lack of leaf surface to sustain it. In making these cuts, cut as close up as possible and make a clean, smooth cut, avoiding splits. On cutting off a large limb, first cut it off 18 to 24 inches above where you are to make the regular cut and then cut off the stub. This will avoid the possibility of a bad split. In doing heavy cutting such as may be necessary in reforming old trees, do it early in the spring before the buds start, never after the foliage is out. Make all cuts in a slanting manner so water will run off.

All cuts larger than three-fourths of an inch in diameter should be painted and kept painted with lead paint. Whenever cracks appear, paint again to keep out the water. If water gets in and the scar is kept wet, decay will start and your tree may be permanently injured. Scars caused by having the bark knocked off, or where limbs have been broken away, should be first trimmed around the edges to make a good, smooth surface and then painted over and kept painted. All cuts and scars rightly cared for will baste over and heal up smoothly. Never use tar or any preparation having tar in it for painting of cuts and scars on trees. Always use a good quality of lead paint.

The question is sometimes asked: When is the best time for pruning? And my answer is, whenever you see an undesirable limb or sprout on any of your trees cut it off if you have a sharp tool to do it with. The "best" time to prune will depend upon what you are after. If you after wood growth, prune during the dormant season, preferably early in the spring. So-called "summer pruning" is practiced where increased fruit production is desired, or to encourage trees to produce on off years. The term is not well applied, however, for it would indicate that "any old time in summer" would do, which is a mistake. The time to do summer pruning is after the main season's growth is over and the terminal buds are formed, which will be about the latter part of August, depending,

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Plums—Culture and Handling of Shipping Plums

By H. C. Blake, Vacaville, California

THIS article covers conditions obtaining only in California. I will not discuss the origin of the plum, as it makes but little difference to the practical commercial grower whether it was introduced here from Asia or Europe or some other place; suffice it to say that nearly all edible plums are found in the north temperate zone. Species of the wild plums are to be found in most all of the countries of both the north and the south temperate zones. Plums furnish us more different varieties than any other cultivated fruit, and also a greater range of flavor, texture, color, size and form. Because of the plum's great variability and the adaptation of the different varieties to different climatic and soil conditions it is the favorite fruit for the many amateur propagators in developing new varieties, and the list of varieties is now almost without number.

For one contemplating going into the shipping plum business geologic location would probably be the first important consideration; next the selection of the proper soil and, third, the selection of varieties, and this last consideration to be somewhat influenced by the markets one intends to patronize. At the present time there are but three or four localities in California that are very extensively engaged in the shipping plum business, located as follows: What is known as the Sacramento River district, comprising that portion of the river territory located between Sacramento on the north and Rio Vista on the south, and including the section around Lodi; the Vacaville district, comprising what is known as the English Hills, and the Lagoon Valley and the Vaca Valley proper; and the Hill section, comprising the Newcastle and the Placerville districts. These three localities are very extensive and successful plum-growing districts, but the conditions obtaining in each are entirely different from the other. If you should locate on the river you would find a deep, rich, sandy, sediment, loamy soil with plenty of water for irrigation. Should you locate in the Vacaville district good judgment must be exercised in the selection of a location. Secure a deep, rich, loamy soil, although if very well drained a heavier soil may be selected if other conditions are attractive. Should you go to the Newcastle district you will find a decomposed granite soil, entirely different from either of the soils just mentioned and requiring an entirely different treatment. In the past the Tragedy has been the great favorite plum on the river, but many of the other varieties succeed well. In the Vacaville district it seems that almost every variety known to mankind is being tried out to the full limit. Of the one hundred and fifty different varieties of plums shipped last season by the California Fruit Distributors Vacaville seems to have been represented in almost every variety. The Newcastle district runs strongly to Burbanks, but follows very closely with any new-born favorite reported from Vacaville. Placerville confines her shipments almost exclusively to Ponds, known in this state as Hungarian or Gross.

When the selection of a location, soil and variety has been settled, the next important problem is the root stock, and a big problem it is, and one on which I hesitate to offer advice except in a general way. The first choice for root stock for all locations and conditions is the Myrobalan, followed very closely with the peach, but the peach requires a very well-drained soil. A most excellent stock, though but little used on this Coast, is the Marianna, a hybrid originating some years ago in Texas. It grows very readily from cuttings and does not sucker or sprout up, as it is commonly called. Great care must be exercised in the selection of a root stock. Some varieties refuse to make a satisfactory union on certain roots, and other varieties refuse to produce a crop, while still others refuse to produce satisfactory quality.

In growing your nursery stock the usual nursery practice is followed. The seedlings are budded or grafted the first season, and usually remain in the nursery until the buds or grafts are one year old, and should have attained a height of from four to six feet. Before the trees are planted in orchard form the land should be well prepared by plowing about eight inches deep with a good turning plow, and this plow should be followed in each furrow with a good sub-soil plow running to a depth of from sixteen to twenty inches. The sub-soiling is sometimes substituted by the use of dynamite, but this must be done when the ground is absolutely dry. Thorough cultivation must be practiced during the life of the tree. For planting the ground must be marked off to require from about ninety to one hundred trees per acre, the lesser number being preferable. This is usually done with a wire about two hundred feet long and having a button of solder at every place where a tree stake should be located. Holes should be dug of ample size to allow for the placing of the roots without crowding, and the soil well settled around each tree either by tamping with the feet or by the use of water.

The tree should be topped at once to a height of about sixteen inches. It seems almost superfluous to urge very great care in every act, but it is absolutely necessary to success. In many localities it is necessary to protect the bodies of the trees from the hot rays of the sun during the first summer season. This is done by the use of shakes or some of the very excellent manufactured tree protectors to be found on the market. During the winter, after the trees have been planted one year, they should be pruned back about one-half or two-thirds of the season's growth, leaving about three or four branches in such a position as to form a good strong head on which to build your future tree. Until the tree comes into bearing the pruning must be done with the main idea of forming a tree as strong and well shaped as possible, and care must be exercised to keep from leaving too much wood in the tree. After the tree has come into bearing and the crop is set the most important step is thinning. Without proper thinning you cannot hope to meet the strong competition of those who do thin and produce a fine, smooth, good-sized and well-colored fruit. With some of the new and improved varieties it is necessary to thin two or three times. Unless the laborer doing the thinning is an old hand at the business it is scarcely safe to let him look at the ground under the tree after thinning or he will never get enough fruit off. Like everything else, thinning requires good judgment and experience.

As the culls from shipping plums are usually a dead loss the pruning and thinning should be done in such a manner as to reduce the percentage of culls to a minimum. As to the state of maturity for picking for Eastern or European shipment, no ironclad rule can be laid down. It is another case where the exercise of good judgment and experience is necessary, as what is proper in one locality would be failure in another. Great care must be exercised not to disturb the bloom on the fruit in handling. Great variation exists as to the proper ripeness at which to pick the different varieties, also the same varieties in different localities. The usual practice by the inexperienced is to pick too ripe and by those after the early markets is to pick too green. The matter of picking must be settled by experience with each variety in each locality. Take, for instance, the Kelsey plum. It will not color on the tree in the Vacaville district until too ripe for Eastern shipment, but will color well en route if picked hard. On the other hand, the same variety in the Lodi district will show a fine color and still be firm enough for shipment. The Climax, when picked straw color or with slight pink at the apex, will ripen and color to perfection en route. The Tragedy may be picked as soon as the blue color begins to show, or it may be left on the tree until almost fully colored and still go the long route and arrive in perfect condition. With the long list of varieties now grown in this state it would be useless for me to try to describe the proper condition of each variety in each locality in this short article.

Plums are usually packed in five-pound baskets, four baskets to a crate. The smaller varieties are usually packed three layers, 4x5 or 5x5, and in some instances with the very early ones as small as 5x6. The larger sizes are usually packed 4x5 and 4x4, and in some cases 3x4. In the extremely large sizes they are frequently wrapped in individual papers instead of being placed in layers between long strips of paper, as is the usual custom. The packing should be done in such

manner that every plum is keyed in plaee, secure but not bruised, and nothing but perfect fruit should be packed. The eover must not press the fruit sufficient to bruise same, but must bear firm enough to hold fruit from being displaced by rough bumps by the train en route.

The man in business tries to follow the lines of least competition. So with the plum grower. During the last few years so much advance has been made in the creation of new and improved varieties that it has stimulated the grower's desire to get his plums in market when the market is as bare of fruit as possible. Under existing conditions this is seeured by getting his fruits to market ahead of others. Many standard varieties now considered comparatively old will always eommand a place on the market, such as Tragedy, Burbank, Wiekso Climax, Hungarian Grand Duke, Giant and Diamond, but many new and valuable varieties are now competing for first place on the list of valuable shippers. Prominent among these are the Beauty, Formosa, California or Vaeaville, Caviota and many others, some unnamed, whieh I am not at liberty to diseuss. One very promising new variety originated by my neighbor, Mr. Burton, which he has called the Earlianna, was entirely harvested by the first of June. It is a good-sized plum, splendid color and shape and an excellent plum for the table, a good bearer and an A1 all-around early blue plum. In conversation with a neighbor reeently, who is growing over one hundred different varieties, he remarked that he would confine his energies in the future to about three varieties, all of them new, sueh as the Beauty, Formosa and California Blue or Vacaville; and after inspecting his orchard his judgment seemed to me to be wise.

From our experience in the past we feel that the possibilities for improved varieties are almost unlimited. As we are now growing many times as many varieties as are needed, and so many as to keep the buyers at sea as to what is being offered them, I think it wise to eliminate all of the second-rate and third-rate varieties, except where absolutely necessary to retain them for pollenizing purposes. On account of the very great variation in the time of blossoming in different seasons, varieties requiring special pollenizing are rather unsatisfactory. A very unsatisfactory condition obtains on this Coast in the naming of our fruits. It is bad eonugh to have to be confused with a thousand or more distinct varieties, but when we add to this trouble by insisting on calling the same variety by four or five different names we are surely in need of a guardian.

And now in conclusion, my advice to those contemplating the shipping plum business is to go slow and to investigate thoroughly first, and to be satisfied with nothing but the best conditions, and then with care and good judgment you are pretty sure of a success that will net you a good income. We now have the United States and Canada for a market, as no other portion of Ameriea grows sueeessfully the fine varieties of plums grown on the Pacific Coast. As soon as the Panama Canal is opened to traffic you may annex the markets of Europe with an exeellent refrigerator steamer serviee direct from your own great City of San Francisco.

Deterioration of Heaters

The Citrus Proteetive League has just received the following letter from Mr. C. C. Teague, general manager of the Limoneria Company, Santa Paula, in relation to the heavy depreciation in oil pots in eitrus groves due to laek of eare. Mr. Teague has had more experienee in the handling of frost-fighting equipment in citrus groves than any other man in the state, and this letter from him should be read and acted upon by every grower who has installed frost-fighting equipment. On aceount of the large amount of money invested in oil pots and the great importance of keeping this equipment in first-class working order for possible use in other years, we are asking the eo-operation of the newspapers in giving publieity to the letter from Mr. Teague which follows:

"I have just returned from a two-days' automobile trip through the prineipal citrus districts of Southern California, and the thing that impressed me more than anything else upon the trip was the tremendous loss that the growers were having through negleet of the care of their oil pots, and it seemed to me to be worth while to try and bring them to a realization of what this means. It has been estimated that the eitrus growers have over two million dollars invested in oil pots. In the two-days' trip before mentioned I only saw a very few cases where the pots had been coated with asphaltum or paint to prevent rusting, and as a consequence nearly all of the pots were rusting badly, and in my opinion will be a mass of junk in from two to three years if this is not remedied—probably in two years. The new type of pot should last at least ten years, and probably fifteen, with proper care, as the burning action is not hard on them until they are burned entirely out, which will rarely be necessary. It then is extremely important that the oil pots should be kept thoroughly painted. In my opinion, if the present method of care is eontinued the growers will meet with a loss of four or five hundred thousand dollars a year in unnecessary depreciation, and at the end of two or three years will be without adequate frost-fighting equipment, and if a freeze comes along will again be badly injured.

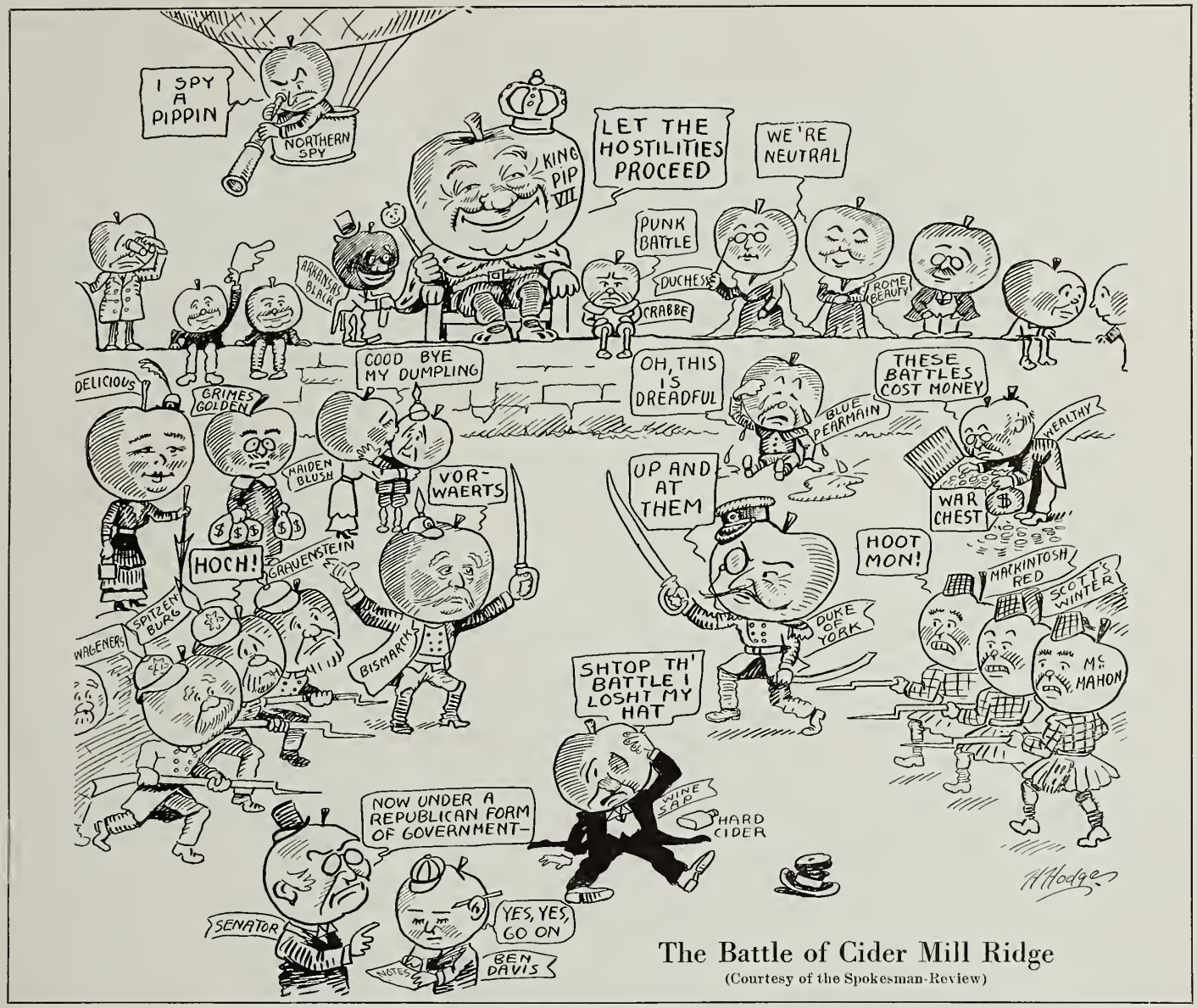
"We have dipped all of our pots in asphaltum paint before putting them out in the field, and if it is necessary to burn them so as to melt off the protecting paint, we then send men around with pails and brushes and touch them up where it is needed. The material that we use is cheap and is made as follows: We take asphaltum and place it in kettles and melt it, then remove it from the fire and after it has stopped boiling dilute it in the proportion of one gallon of stove distillate to ten pounds of asphaltum. This stoek mixture is then put in barrels ready for use. If it proves too thick to apply well with brushes, it can be diluted with engine distillate or gasoline to the required consisteney. The paint herein deseribed costs less than ten eents per gallon."—F. O. Wallsehlaeger, Secretary Citrus Proteetive League of California.

Handling By-Products

Means of eonverting second and third-grade fruit and vegetable products into marketable goods are the subjects of a new bulletin on fruit and vegetable by-products, written by Professors C. I. Lewis and W. S. Brown and issued by the Extension Division of the Oregon Agricultural College.

"It is comparatively easy to sell high-elass fruit or vegetables," says the bulletin. "They are in sueh demand and bring such high priees that they justify high eost of production, expensive freight rates and higher eharges for distribution and selling. Our problem is thus seen to be concerned not so much with fancy produce as with seeond and third-grade produets—the low grades, so to speak. These grades will not justify a heavy outlay. Furthermore, the amount of them is inereasing eaeh year and the bulk of this fruit in the Northwest is becoming enormous. How best to utilize sueh products is testing the greatest brains in the eountry. We must attempt to utilize all our products in some form or other and reduce the enormous waste now taking place. We believe that the fruitgrowers' assoeiations and the general selling agencies are going to find it to advantage to handle various fruit products. The best grades of fruits can undoubtedly be best disposed of in a fresh state, but the other grades in many cases will bring more satisfactory returns when utilized by the canneries, vinegar works, evaporators or jelly factories."

The bulletin deals with the by-products plant as an adjunct to fruitgrowers' associations. In it are considered the problems of the amount of capital necessary, the best system of organization and the technique of handling that is bringing the best results.



The Battle of Cider Mill Ridge

(Courtesy of the Spokesman-Review)

Some Factors in the Control of Pear Blight

By P. J. O'Gara, Chief in Charge of Agricultural Investigations, American Smelting and Refining Company, Salt Lake City, Utah

THE interesting subject of pear blight and its control has been so frequently discussed before the meetings of the various horticultural organizations of the Pacific Coast and Pacific Northwest that I take it for granted that practically every grower of pome fruits fully understands the nature of this disease, which should be properly termed the Bacterial Blight of Pome Fruits. Besides attacking all pome fruits in a more or less serious manner, the bacterial organism of pear blight also attacks, in a limited way, various members of the stone-fruit family. I take it for granted that the fruitgrowers who have heard the subject of pear blight frequently discussed know of its early history and native origin, namely, that it is a strictly North American disease and was first noted on the highlands of the Hudson, New York, by William Denning in 1780. Until a few years ago the disease was confined to the North American continent, but it is now known in two or three parts of Europe, having been noted as occurring there by certain agricultural explorers of the United States Department of Agriculture. However, from all accounts of its occurrences in Europe we are led to believe that it has not as yet become a serious menace to fruitgrowers. With this introduction, we will proceed to discuss some of the important factors in the control of a disease which in many ways is more destructive than all the other diseases which the fruitgrower must combat.

Cause of Serious Infection.—In order to have a serious pear-blight epidemic the following conditions are necessary: (1) The germ must be present; (2) insect or other agencies for the "sowing" or spread of the blight organism must be plentiful and active; (3) conditions for the best development of the germ after it has been "planted" must be favorable. Another factor, and an important one, might be added, and that is lack of adequate means for the eradication and control of the disease. It is easily seen that there can be no infection if the blight germ is not present, and, furthermore, there can be no epidemic even though the blight germ be present providing the other factors are wanting. Those who have had experience with pear blight know that it will attack all species of the pome family, and that any part of the tree may become infected,—blossom, twig, limb, body, crown, root or fruit. Such expressions as "blossom blight," "twig blight," "body blight," "collar-rot phase," "root blight," "fruit blight," "fire blight," etc., are all in a measure misleading, as fruitgrowers are often mistaken in thinking that these terms indicate a different disease in each case. The term "fire blight" is not a good one, for the reason that fire-scorched trees do not resemble trees badly blighted by the blight germ. Furthermore, serious infection which may result in the death of the tree may not show any indica-

tion of the so-called "fire blight." This is true in serious crown and root infections. The term "collar-rot phase," as used by an occasional writer, is a notably bad one, simply because the germ does not produce a rot. The germ causing pear blight does not belong to the rot-producing group of plant parasites. Even the term "pear blight" is not good; it would be best to make use of the term "pome blight" or, better, "bacterial pome blight." There are certain other diseases of pome fruits which often produce effects somewhat resembling the bacterial blight, and therefore it would be much better, in speaking of blight, to qualify it. If we would use the term "bacterial blight" in the case of pears, apples, quinces and other pome fruits we would not fall into error.

As stated above, in order to have a general infection or, for that matter, any infection, the blight germ must be present. It has been demonstrated that this germ will live during the dormant season of a tree in the cankers formed by the previous year's infection of limbs, bodies or roots of pome trees. The germ "holds over" or lives over in no other place. No part of the pome fruit trees may be free from infection. The germ is carried from these centers called "hold overs" by various agencies, principally insects. However, birds and other animals, even man himself, may be distributing agents. A very large number of species of insects and their near relatives have been found to be carriers of the cantagium vivum, the pear-blight bacillus. Not only flying insects have been found to be effective in spreading infection, but also many insects and insect-like species, which do not depend upon flight have been found to be particularly dangerous. While the odium of the fruitgrower has been heaped upon the honey bee, it must be remembered that this beneficial insect is active during a relatively short period of the season, that is, during the period of blooming. Certainly the honey bee spreads infection at this time provided that oozing hold-overs are present in the orchard, or at least in the neighborhood. It has been particularly noted that serious blossom infection in pears, especially the early-blooming varieties, rarely occurs. The reason for this is because at this time, when the days are relatively short and moderately cool and the nights relatively long and generally cold, the hold-overs are not actively oozing. The important factor, namely, the presence of active organisms is wanting. Later, when the late-blooming varieties of pears and apples are blooming, conditions are favorable for the germ and all hold-overs in pome-fruit trees generally become active because of the favorable conditions for growth. The number of days in any season when the honey bee is active in the orchard may be known by noting the number of days covered by the blooming period. When the blooming season for orchard fruits is over, the honey bee will be found to be busy on a different variety of flowering plants. It is well known that bees do not visit more than one group of flowering plants at the same time; that is to say, the bee works wholly upon the apple during its season, then turns to some other plant, and then another and so on. Even the amateur bee-keeper knows that honey of different color, flavor and quality comes from different plants.

It is well known that the greatest amount of infection may occur, and usually does occur, at a time when bees could not have carried the infection. Of course, the primary infection noted in some of the blossoms was probably carried there by the bee, but subsequent infections of the later blossoms, twigs, shoots and watersprouts are certainly caused by other agencies. Biting and sucking insects are here responsible. Aphides are notably bad as carriers of the pear-blight germ. Upon the control of blight, therefore, depends in a great measure the control of insects. However, in the first place all sources of infection, namely, the hold-over cankers should be carefully removed. This is a difficult thing to do, for the reason that the most careful worker will often miss hold-over blight, especially if the hold-over occurs in the body or root system of the tree.

Resistance and Susceptibility.—We know that there are varieties of pome fruits which are quite resistant, others that are very susceptible to the pear-blight disease. We often hear of varieties being "immune"; but, so far, no species of the pome family has been found immune to blight. There are various degrees of resistance, and that is about all that can be said. Very often the attention of the fruitgrower is directed away from resistant varieties by the statement that they are so resistant that blight will not hold over in them. However, every fruitgrower knows that our cultivated varieties of pome fruits are not growing on their own roots. For instance, a Bartlett pear is not all Bartlett; a Newtown apple is not all Newtown, and the same may be said for any other variety. Until recently no attention was paid by nurserymen to blight-resistant stock upon which to work our commercial varieties. In the main, our commercial varieties of pears are all worked on French stock which is very susceptible to blight. Our commercial varieties of apples are also worked on seedling stock which is never selected for its resistance. From this it may be readily seen that, although the variety top-worked on the stock may be quite resistant, the stock or root being susceptible renders the tree unsafe from the blight standpoint. It is often said that a chain is no stronger than its weakest link, and, in the same way, any variety of pome fruit is no more resistant than its least resistant part, and if this part be the root system so much the worse for the tree. If the root system is very susceptible, the tree may be lost, although apparently there may have been no infection noted above the graft union. I have seen the worst cases of blossom and twig infection in very resistant varieties where not a single hold-over could be found in the orchard itself or in the immediate vicinity so far as the examination above the graft union was concerned; however, by noting the infection centers, examinations of the growths and roots below the ground showed the presence of hold-over blight in certain trees. In the case of the Newtown (and I am only using this variety as one example), which is quite resistant under average conditions, I have found the most serious hold-overs in the roots (stocks). Here, then, is an important factor in the control of blight. Not only should the parts above the ground be examined, but the crown and roots of a tree should be bared and inspected so as to be sure that no hold-over exists there. There is no mystery about crown and root infection; certain insect agencies work as readily under ground as others do above. Furthermore, in cases of severe blossom, twig or limb infections, these may be carried down to the roots from above by rain. I have been able to demonstrate the presence of blight germs in droplets of rain water trickling down the trunks of infected trees. Referring again to the matter of insect control, it may be said that the persistent use of insecticides, such as some of the better sulphur compounds, arsenicals and nicotine compounds, together with sticky bands, will go far to reduce the amount of summer infection. It has been particularly noted in certain districts on the Pacific

Coast that the orchards freest from blight infection were those where insects were kept well under control.

The Use of So-Called Remedies.—Tree medication has always been a favorite hobby with those who are ignorant in matters of plant physiology and pathology. Theoretically, there may be some basis for this kind of work, but the practice of controlling blight by the use of the hypodermic needle or any other method for the introduction of "dope" into the tree has proven unsatisfactory. Occasionally we find a man who is absolutely sure that he has prevented blight infection by boring a hole to the heart of a tree and filling it with such insolubles as sulphur, charcoal and calomel. However, had he looked about for another explanation as to why his experimental tree did not blight he would have easily found it. In my investigation work covering a long period of years, I have used all sorts of chemicals and chemical combinations in various ways, but up to the present time no promising results have been forthcoming. A drowning man will grasp at a straw; we have grasped at everything, whether it showed promise or not. We are able, by the use of chemicals applied to the soil, to inhibit the growth of the tree by reason of the fact that the root system of the tree will take up from the soil any water soluble substances. But, inhibiting the tree's growth is not, after all controlling blight. Lack of a reasonable amount of vegetative vigor will result in the production of fruit of inferior quality. The work of pear-blight control must depend, at least for the present, upon the methods which have been worked out, namely, careful eradication of hold-over blight, through disinfection of instruments and wounds, and last, but not least, the control of all insect agencies which aid in spreading infection. During the growing season, blight should be removed whenever it appears; and living infection should always be considered a center for further spread of infection.

Breeding and Selection.—Breeding and selection, we hope, will in time solve the question of blight control, but for the present we must adopt the best practice known to save the pear and apple orchards now in existence. The promise that in perhaps ten, one hundred or one thousand years we will have commercial varieties of pome fruits at least as good as the best varieties now grown and wholly resistant to blight is small comfort to the man who must depend upon his orchard for his present livelihood. The man must know what to do now to save that which means to him his all. There may be some of my readers who would like to tell of the wonderful work now being done along the lines of selection and breeding of pome fruits resistant to blight. I wish to say that ever since the life history of the pear-blight germ was first fully understood important work along this line has been in progress. The work now being carried on by certain individuals savors of nothing new, and besides this work is very limited in its scope as compared with work that began more than a quarter of a century ago, and which as yet has not produced any startling results. Do not get excited over the persuasive eloquence of the tyro who has had little or no experience in selection and breeding, and who has not had time to demonstrate whether or not he has anything in sight. The development of commercial varieties of pears equal to our well-known varieties and at the same time resistant to blight is an ideal we have been striving toward for many years. Many European-Oriental hybrids of considerable resistance have been produced, but their quality does not compare with even our mediocre commercial varieties of European blood. I have in mind such varieties as Kieffer, LeConte, Garber, Smith and others. Although the above-mentioned varieties are being grown in considerable quantity, nevertheless we do not hear of their quality as compared with our well-known Bartlett, Anjou, Bosc, Comice and Winter Nelis.

Cause of Pear-Blight Epidemics.—Every fruitgrower has noted that blight is more prevalent some years than it is others. It has been noted that, although little effort had been made toward eradication during the previous dormant period, meaning that much hold-over was left, a relatively light infection occurred the following season. On the other hand, it is has been found that, although considerable effort had been put forth in eradicating hold-over blight, the following season resulted in much infection and serious losses. To some, this is an apparent paradox. The question is often asked as to why we have epidemics of pear blight. This question is no more difficult to answer than the question as to why we have enormous yields of fruit or harvests of grain. No farmer expects his crop yields to be the same from year to year, at least if he expects this he does not often realize it when the harvest is over. The answer to the question as to why we have more bountiful crops one year than another is usually given by the average man in a single sentence, namely, that the conditions were more favorable. The reason why we have occasional phenomenal yields is because the conditions for plant growth have been unusually good. In the case of a heavy wheat crop the seed was put in at the right time, and in the proper amount, the soil had been previously well prepared, climatic conditions during the growing and ripening season were favorable, and more than likely good judgment was used in taking advantage of favorable natural conditions. It must be remembered that the pear-blight germ is a plant which depends upon favorable conditions for its best development; it must be "planted" on the right soils, and the conditions for its maximum growth and development must be favorable, as in the case of the wheat plant. It is true that epidemics of disease, whether in animals or plants, are quite frequently preceded by periods in which there has been a lack of thoroughness in control work. Very often the absence of serious infection and the consequent absence of disease results in inducing a spirit of carelessness in the matter of careful inspection and eradication. The present outbreak of the foot-and-mouth disease in the United States among stock is a good case in point. The last serious outbreak occurred a good many years ago, and as time went on watchfulness gave way to carelessness and to lax methods of inspection and quarantine.

While it is known that disease-producing bacteria may be more virulent at one time than another, just as seeds may be more or less viable, nevertheless the conditions for a disease-producing organism's development must be favorable or it will not develop so as to cause an epidemic. However, it is for the epidemic which is liable to occur that we must be prepared. It must be remembered that the pear-blight germ is a plant, and that, as a plant, it will not make its best growth where conditions are below normal. Change these conditions for the better and maximum growth or development will result. If the fruitgrower will remember that the pear-blight germ is a plant, he will understand that the same conditions of environment which influence the growth and development of his cultivated plants will also influence the growth and development of the pear-blight germs. Hence, there will be epidemics of pear blight as there will be "epidemics" of good fruit crops.

BETTER FRUIT

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ADVERTISING RATES ON APPLICATION

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By-Products.—In the year 1912 when the crop of apples was very heavy and the prices low, the editor of "Better Fruit" saw the necessity of only shipping high-grade fruit to Eastern markets because the low grade did not justify the expense necessary in marketing it. In other words, it did not pay a profit. Consequently after giving the matter a great deal of serious thought, it seemed wise to take steps to encourage the development of vinegar factories, cider mills, evaporators and factories for making various by-products. After several months of investigation a number of people were found who had had practical experience and knowledge in this line of business, and from them was secured a number of excellent articles of a practical nature in reference to the by-product industry. When all of this data was secured, it was published in a special edition of "Better Fruit" in May, 1913, and called the "By-Product Edition." The stimulus was quickly felt by fruitgrowers of the Northwest and they were quick to realize the value of this suggestion. Consequently this subject was discussed very vigorously and very generally by the fruitgrowers of the Northwest during the year 1913. Officers connected with the National Apple Show at Spokane have always shown their progressiveness in assisting the fruit industry in every way possible and they realized the importance of this industry, and therefore accorded by-products a special place on the program in the conference of growers. The result was that the movement immediately jumped into popularity and resulted in a committee being appointed to carry on research work along this subject. This committee has done some splendid work and accumulated an immense amount of information and data of great importance. All of this was embodied in their report which was given to the fruitgrowers at the Seventh Annual National Apple Show in Spokane from November 16th to 21st. In the meantime, in April, 1914, "Better Fruit" published another special edition along this same line. After the report of the committee was received and accepted a new committee was appointed to carry on this work, including many of the old members of the original committee. It seems to be the consensus of opinion that a number of by-product factories can be built throughout the Northwest, and will be built, either co-operatively by the growers themselves or perhaps in some localities by individuals or privately incorporated companies. It is the desire of the committee to assist in building by-product factories and to give all information possible. In addition to this, the committee believe that some central marketing agencies must be utilized or established to handle the output in order to obtain the most satisfactory results for the by-products produced. This can be done much better by a concern handling an immense volume of this line of business than it could be done by a small number of individual concerns. The overhead expense of selling would be reduced by handling the output through one large concern and the field could be more thoroughly covered by one concern with a large number of salesmen than it could by a lot of individual concerns. In addition to this, one large concern can advertise and build up the trade and create the demand more satisfactorily than a number of small individual concerns. There are growers in many districts who believe in co-operative by-product factories. There are some who believe in privately-owned by-product factories. The solution of this problem seems to be one that will depend a good deal on circumstances and the condition of the growers financially. Without question a larger proportion of the growers believe in co-operative work. If they are in a position to establish a co-operative by-product factory all well and good. Good judgment would dictate the advisability of going ahead. Where growers are not able to finance a co-operative institution without question the advisable thing to do will be to encourage a privately incorporated institution to take care of the waste and convert it into by-products. Every grower always has, and always will have, a percentage of cull apples that are hardly high enough grade to justify packing, which will vary perhaps from ten to twenty per cent. On younger orchards the percentage might be smaller. At the present going prices of cull apples per ton of $6.00 in some districts this would amount to $10.00 or $20.00 per acre to the fruitgrower, and it seems safe to say in many cases that it would equal the maximum figure of $20.00. The grower, in harvesting the crop, has to pay the expense of picking, grading, etc., and whatever he receives from the by-product factory for his cull apples is money saved. A man with forty acres, with a good by-product factory nearby, will secure an income of $800 more than he would if he had no place to dispose of his cull apples. The fruit industry of the Northwest is probably somewhere in the neighborhood of $5,000,000 to $10,000,000,—an immense sum. A comparison with California will give some idea of the opportunities in the Northwest for disposing of their fruit in other ways than selling it fresh. The canned fruit industry alone in California amounts to between $25,000,000 and $30,000,000. While the editor has never seen any figures as to the value of by-products in California, he has been informed that the total amount received in California from other sources than fresh fruit, such as canned fruits, evaporated fruits, raisins, wine, etc., amounts to approximately $75,000,000 or nearly fifteen times as much as the fresh-fruit industry of the Northwest.

Reducing the Cost of Apples From the Packing House to the Retailer.—The editor of "Better Fruit" took part in this discussion at the National Apple Show at Spokane. Considerable progress has been and is being made along this line. The first item of consideration in this subject was reducing the harvesting cost, which will be explained in detail in a separate article in this issue. The second important feature in the discussion pertained to reducing the selling expense of our selling organizations. This discussion was ably handled by the editor of the Spokesman-Review, a man very highly esteemed by fruitgrowers in the Northwest, well and favorably known by all. His idea was that owing to the large number of selling concerns already in existence in the field, that there must necessarily be a large duplication of overhead expense. With suggestion and advice he conveyed the idea that the next important step in the Northwest would be for the fruitgrowers to reduce the number of marketing concerns. There are several methods of marketing in vogue at the present time; first, the co-operative association, owned and controlled by the grower; second, marketing concerns which are incorporated with a definite capital, not necessarily confined to growers; third, by private concerns which are engaged in handling fruit for the fruitgrower at so much per box, or sometimes buying the same outright from the grower; fourth, by dealers who handle large quantities of apples for individual growers, either buying the same direct or making an advance and selling on a consignment basis; fifth, individuals who either sell their crop direct, accept an advance on consignment or place it on consignment without an advance. Some of these different marketing concerns are more or less similar in their policy and in all probability could be harmonized with others in existence. In other words, it would seem possible that certain

groups could be harmonized under one policy and other groups harmonized under another policy which would reduce the number of marketing concerns. This suggestion may not carry out the idea advanced by some that all of the fruit could be marketed through one agency. This may be done; there are many who believe that it could be done and there are others who believe that it is doubtful that the fruit in the Northwest could ever be marketed entirely through one concern, and even go so far as to say that if it was such an arrangement would be indefinite in its continuance. However, be all that as it may, it seems certainly advisable to reduce the number of marketing concerns.

The January edition of "Better Fruit" will be devoted to spraying and will contain everything that is interesting, valuable and new in reference to spraying that is at all recent. In addition to this, it will give publicity to the Manufacturers' and Land Products Show in Portland, with illustrations of some of the exhibits, and also will feature the National Apple Show at Spokane with a story and illustrations. Publicity in "Better Fruit" in reference to these shows will be confined principally to the fruit displays, for the reason that "Better Fruit" deals almost exclusively with fruit.

Cost of Harvesting.—In harvesting apples there are ten items of expense,—the price of the box, hauling knocked-down boxes to the orchard, making up, picking apples, hauling apples from the orchard, grading, packing, extra packing house expense, nailing up and hauling to the depot. It is not often that growers can give you an itemized expense per box along this line. Every business man connected with a factory aims to ascertain the cost of each particular part of the work. This is absolutely necessary in order to manufacture at minimum cost. It is equally important that the grower, too, should know the actual cost of each one of these items in order to see where a saving can be made.

A few years ago the editor of "Better Fruit" published figures which resulted in much discussion and much good resulted. They enabled many orchardists, by comparison, to ascertain where the expense was too high and thereby reduce the harvesting expense. Below are given the items of cost of each one of these transactions on a crop of seven carloads, the total cost being 36 cents per box:

(1)	Box	$0.095
(2)	Hauling k.d. boxes to orchard	.005
(3)	Making up box	.01
(4)	Picking	.0863
(5)	Orchard hauling	.0116
(6)	Grading	.0468
(7)	Packing	.04
(8)	Extra packing house expense	.005
(9)	Nailing up	.011
(10)	Hauling to depot	.017
		$0.3277
	Paper	.033
		$0.3607

One grower claims to have harvested his apple crop at 27 cents per box. Others state their crop cost as high as 50 cents to harvest. In the itemized list given above the picking expense can be reduced to 4 cents. The picking cost is especially high in this case, as the crop was scattered over a large acreage and the yield light. A number of growers have contracted with their help to pick their apples at 3 cents per box, loose, which is equivalent to about 4 cents per box packed. The grading cost can easily be reduced under favorable conditions to 3 cents per box, and possibly may be done for 2½ cents per box. A number of growers have employed packers at $2.50 per day with the understanding that the packer must pack 100 boxes in order to earn $2.50, reducing the packing cost 2½ cents per box or less. Nailing up can be reduced to about three-quarters of a cent per box.

To summarize, a saving of picking can be made on above itemized expense of		$0.0463
On grading		.0168
On packing		.015
On nailing up		.002
Or a saving of		$0.0801

Thereby reducing the cost to 28 cents per box, which apparently seems to be what would be considered the minimum.

More Profit in Apples.—Another editorial in this issue shows where a reduction in harvesting can and is being made; another editorial points a way to reducing the selling expense of our marketing concerns by reducing the number and at the same time securing a better price. To this must be added another important feature in connection with the cost,—that of reducing the cost of growing or producing the crop. In these three items considerable money can be saved the grower, but perhaps more important than this in enabling the grower to make more money is the importance and the necessity of reducing the retail price to the consumer. In the year 1909 the editor of "Better Fruit" was invited by Professor Thatcher, then Director of the Experiment Station at Pullman, Washington, to accompany the lecturers on their institute meetings throughout Yakima Valley, which covered the territory from one end of the valley to the other, and lasted a week, consisting of eighteen different meetings. At that time the Northwestern apples were selling from 75 cents to $1.50 per dozen, retail. The editor

of "Better Fruit" endeavored to convinee the growers that this exorbitant retail priee would ultimately and in the near future be a menace to the fruitgrower. However, little attention or eonsideration was given to the idea advanced at that time. In the year 1912 growers began to agitate this subjeet, and in 1914 the growers of the Northwest were almost unanimously united in the idea that nothing was being done to hamper the apple industry more than the exorbitant retail priees that were being asked. In 1910 the editor of "Better Fruit" took this subject up with prominent handlers of boxed apples and discussed the matter quite thoroughly, finally being informed by the dealers that when apples were sold to the retailer the right and title had passed and the dealer had no lieense in either suggesting or dictating to the retailer what price he should sell at. But in 1914, we are pleased to say, dealers throughout the country are taking a different attitude, frequently advising and endeavoring to show the retailer how he ean make more money by selling a greater quantity at a reasonable profit than he can by selling a smaller quantity at a high profit. To sum up the importance of selling apples at a lower priee retail, the retailer by handling a greater quantity at a smaller profit ean make more money than by handling a smaller quantity at a larger profit. The lower the retail price the greater the consumption will be. The greater eonsumption the better the demand will be and therefore firmer jobbing priees, whieh means more profit for the dealer and at the same time better prices for the grower.

National Apple Day and a Greater Consumption.—Nothing that has been done in the apple business illustrates the possibility of a greater eonsumption of apples more forcibly than the eampaigns pulled off on National Apple Day in the eities of Portland and Seattle. Eaeh one of these cities has a population of somewhere between 250,000 and 300,000. In Portland in the year 1913 National Apple Day was featured, and again this year an extensive eampaign of publieity was put on some time in advanee of National Apple Day and arrangements made for supplying the eonsumers at a reasonable price and the sale of apples stimulated in many ways. The result was that in about two weeks the sale of apples amounted to 80,000 boxes. In an interview with Mr. Frank Ryan of Seattle, who was ehairman of the committee for National Apple Day, a number of features that contributed to the suceess of their campaign in Seattle were related very forcibly. The Seattle campaign was thoroughly and extensively planned. In the first place, a committee was appointed, eonsisting of fruit dealers, fruitgrowers and prominent business men, to map out the campaign of procedure. Briefly stated, it was as follows: They made arrangements with all of the wholesale fruit dealers and later ealled a meeting of 600 groeerymen and retail fruit dealers and arranged with them to encourage consumption in every way possible and during the eampaign to retail apples at a profit of 15 eents per box. In addition to this, arrangements were made with a delivery eompany for a blanket rate to deliver a box of apples to any address in the City of Seattle at 15 cents per box. The apples retailed at various prices, aeeording to grade and variety, all the way from about $1.00 per box to $1.75 per box. The aim of the committee was to see that every family in Seattle seeured a box of apples. Arrangements were made with retail dealers, where one of their eustomers or anybody living in their distriet was not able to purchase a box, to have a box sent to them, to be paid for by funds raised by the eommittee. Some 1500 boxes were given away in this manner. During one week, Mr. Ryan stated, that 60,000 boxes were sold in the City of Seattle. The population being 300,000, this would mean one box to every five people, or praetieally one box to every family in the City of Seattle. The population of Seattle is approximately 300,000; the population of the United States is approximately 90,000,000, or 300 times greater than that of Seattle. Therefore, if Seattle purchased 60,000 boxes, the United States, if apples were properly distributed so that every seetion could

be supplied and sold at reasonable prices like they were in Seattle at retail, with the proper amount of publicity and the proper arrangements for delivery, would have purchased 18,000,000 boxes, or bushels, in one week. Ten weeks would mean 180,000,000 bushels at the same rate. The government estimate, which is generally conceded by fruitgrowers to be far greater than the actual yield, is given as 210,000,000 bushels. In other words, the whole apple crop of the United States could be consumed in ten weeks, whereas the period of sale and consumption begins in September and lasts until about the first of May, covering a period of about eight months. Apparently it would seem fair to conclude that only about one-third of the consuming public are being properly supplied with apples at all times at reasonable retail prices. Take Oregon for another illustration. The crop of apples in the State of Oregon will not exceed 2,000 carloads, or about 1,200,000 boxes. If Portland consumed 80,000 boxes of apples in two weeks, then the City of Portland alone could consume the whole apple crop of the State of Oregon in less than eight months, the usual apple season. Or the State of Oregon, which has a population of about three-quarters of a million, could consume its whole apple crop in about two and one-half months if people would consume apples like they did in Portland during the campaign. Such illustrations as these are about as strong evidence as can be furnished indicating the possibility of creating a greater consumption of apples.

Advertising the Apple.—The Northwest Fruit Exchange began putting up a brand of apples known as the Inter-Community Brand called "Skookum," which in the Indian language of the Northwest means "the superlative degree," or the best in every respect. This brand is high class and is confined to apples of superior eating quality. As I remember the varieties, they are Jonathan, Grimes Golden, Spitzenberg, Delicious, Ortley, Winter Banana, Winesap, Stayman Winesap, Newtown and Rome Beauty. Very attractive advertising cards in colors are placed in each box. The Northwest Fruit Exchange has carried on a large publicity campaign in the City of New York advertising the "Skookum" brand in these ten varieties, consisting of newspaper advertising, street-car advertising, etc. A beautiful card about two feet long and ten feet wide has been printed in colors showing each variety, with the name of the apple underneath; also underneath each variety the time at which it is best for consumption. The Northwest Fruit Exchange made a very attractive exhibit of "Skookum" brand apples at the Manufacturers' and Land Products Show at Portland and another display at the National Apple Show in Spokane. On one of the placards in the booth it was stated $10,000 was being spent in the advertising campaign,—another evidence of the value of advertising and publicity in creating a greater consumption of apples.

Self-Competition.—With a large number of marketing concerns in existence, much complaint seems to exist, which is quite universal, that self-competition has unnecessarily cut prices this year. Fault finding has been more or less general and therefore cannot be well laid to any one institution in particular. Some experiences has already been cited where sales have been actually made at a satisfactory price to the purchaser and lower prices quoted by some competing concern, varying from ten to twenty cents per box, which, as can be readily understood, caused trouble between the seller and the buyer. Just how such differences of opinion can be eventually settled remains to be seen. However, such circumstances illustrate the fact that unnecessary self-competition is a big factor in establishing the selling price of apples below the actual marketing value.

The North Pacific Fruit Distributors made a very attractive and original display at the Manufacturers' and Land Products Show at Portland, consisting of a very handsome display of boxed apples and a light house, all made of apples, about twenty feet in height. At the National Apple Show at Spokane a solid bridge about thirty feet long and ten feet wide was built from apples, being fashioned after the stone-arch bridge, with a very attractive sign signifying that the Distributors were the bridge between the fruitgrowers and consumers.

Plant Pathologists to Meet

A meeting of the Western American Phytopathological Society is to be held at Corvallis, Oregon, December 28, 29 and 30. This meeting is planned primarily for the benefit of technical plant pahtologists, so that they may get together to discuss problems of particular interest in the western area of the United States and Canada. The practical problems connected with control of plant diseases, however, will also be considered by the meeting, so that it should be of interest not only to technical men but also to practical growers who are interested in making a careful study of problems which they have. Plant pathologists and persons who are interested are cordially invited to attend this meeting.—Wm. T. Horne, Secretary-Treasurer, University of California, Berkeley, California.

Pruning for Fruit Every Year

By Professor W. S. Thornber, Lewiston, Idaho

THE fruit industry of the Pacific Northwest has received another severe shock this year in being unable to satisfactorily market its early varieties of apples. This is again going to cause hundreds of orchardists to neglect their trees and permit their orchards to get in such condition that it will be impossible for years again to produce large quantities of extra fancy fruit. Conditions of this kind are always unfortunate, but the most serious difficulty is that the effect will be very lasting, even to the extent of causing the destruction of some very good orchard properties.

One of the first, yet very important factors to receive neglect in an orchard is "pruning." Spraying must be done because some of our good state laws say so. Cultivation and irrigation, or irrigation is essential to the life of the tree in certain districts, but no law says you must prune, nor has a tree ever been known to die because of the lack of pruning, and so for this reason I consider pruning a very essential factor for the future good of the orchard. In the past we have heard much about the pruning and training of young trees. We have had differences of opinion as to whether the tree should be headed down to six inches from the ground or thirty inches from the ground, and whether the framework should consist of three limbs or more, and even some have gone so far, without considering other factors, as to tell us in just what moon to prune for wood and for fruit. Theoretically this has been fine, because we could definitely plan our work, but practically it has been another story, and so after years of practical experience in the orchard, I want to give you my observations on how to prune for fruit every year.

First of all, let me correct any misapprehensions that might exist along the line that cultivation, irrigation, spraying, fertilizing or even pruning alone can under even the most favorable conditions always produce fruit. No one of these horticultural practices, no matter when done, can make a production of fancy fruit on a tree, if any one of the others is seriously neglected. They are as closely tied together as any group of natural laws of the universe. By breaking one you interfere with the working of the others, and so it is inadvisable to consider the pruning of an orchard without taking cognizance of its cultivation in the past and the probable cultivation of the future. Long ago horticulturists recognized the unity existing among the factors of cultivating, spraying, pruning and fertilizing, and that it was essentially the business of the grower to see that these worked in harmony and that each was given its due consideration, but with the addition of "irrigation," complications have arisen among the factors, and while all are affected, since I am confined to pruning I will deal with this factor alone.

Assuming that the tree has reached bearing age and size, and that it already has its fruiting wood, two rather minor factors closely allied to irrigation become strongly apparent. These are: (1) Abundance of available fruit-bud food at the proper season of the year. (2) Sufficient moisture during the close of the growing season to perfect the development of the fruit buds. We have learned that the wrong interpretation of these two factors is just as detrimental as the ignoring of either or both. Of course most lands in the Northwest have abundance of plant food, however we occasionally find limited areas that need correction or additional food for the best fruit production, and strange as it may seem, this correction has in several instances been made through a spray, a spray of plant food in dormant trees. The application of large quantities of complete fertilizers to the soil of the orchard, not infrequently retards and indefi-

nitely postpones the production of fruit, while limited quantities that will become available early in the growing season accelerates or increases fruit production, providing sufficient moisture is available during the close of the growing season. For best results I want my trees to make a strong, vigorous spring growth, followed by a long, slow summer and fall growth. Sufficient moisture during the close of the growing season to perfect the development of the buds formed early in the summer is, to my mind, an extremely important factor and one that cannot be profitably overlooked by any practical fruit man.

It might be intercsting to know that a large percentage of the fruit buds of a tree are formed during June and July, and that the available plant food and supply of moisture during August and September very largely governs the spring in which they will bloom. Of course variety enters into this also, and while the very tardy bearers like Spitzenberg and Northern Spy respond, they are rather slow as compared to many early bearers. My attention was first very forcibly directed to these factors some five years ago while making a critical study of two young peach orchards, planted at the same time, by the same party, from the same stock, cultivated exactly alike, pruned the same, by the same man, and separated only by a wire fence. Yet one of these orchards at that time was bearing a big crop of fine fruit, and has annually since produced excellent crops. The other orchard, up to last year, never produced even a fair crop. Now don't tell me it was due to frost, soil, rain, ownership or the state in which they grew, because these factors have all been considered. Then, where is the difference? One property was given annually a most thorough irrigation during the months of August and September for the purpose (according to the owner's viewpoint) of preparing the trees for winter, the other was permitted to remain dry during these same months until the late September or early October rains came.

What, then, were the results? The non-irrigated trees ceased to grow early in August and dropped their leaves by the end of the month without developing fruit buds or piling up reserve material for vigorous spring growth, while the irrigated trees continued to grow until late October or early November and then reluctantly dropped their leaves, but not until large fruit buds had been produced in abundance, and the twigs and bark were gourged with plant food for spring growth. These trees could not help but bear fruit, and it would have mattered little how or when they were pruned so long as the fruit buds were undisturbed. They would have fruited just the same. The non-irrigated trees could not bear fruit because they were too nearly starved, nor could any amount of pruning compel them to bear fruit. This condition prevailed for four years in succession. During the months of August and September of the fourth year, the non-irrigated orchard received abundance of water, developed an enormous crop of fruit buds and produced a good crop the following year. This same condition has been repeatedly observed with reference to apple and pear trees, until now we come to recognize the fact that moisture during the fruit-bud formation period is quite as important a factor as any other practice, art or condition.

After this rather lengthy introduction, I want to give briefly my plan of pruning for fruit every year, and while I recognize that it will not be applicable to all conditions, yet I am sure that it is worthy of the consideration of every practical fruitgrower. From the planting of the orchard up to the third or fourth years, I desire a strong, vigorous growth, and while I do not save even one-half of the first two years' growth, it must be strong enough to provide the scaffold limbs of the trees. From this time forward, I permit fruiting wood to form and even permit the trees to bear limited quantities of fruit, recognizing in this the one fact, and that is the establishing a relation or balance of nature between wood formation and fruit production, a balance that must never afterward be disturbed or broken. Trees brought

into bearing in this manner can readily be forced by sytsematic pruning to produce annual crops. While those compelled to produce large size and great quantities of wood up to the fifth or sixth year without producing fruit come into bearing with a bang, produce a big crop, exhaust themselves and take the next year or two to recuperate, and then they do the same thing over again. The good orchardist then says it is not natural for these trees to produce big crops annually, and I am sure we all agree with him.

The first and essential thing to do with a tree large enough to bear is to establish this balance of nature. This may be accomplished by using one or more of the following methods: (1) Checking wood growth by means of clover, alfalfa or some other crop. (2) Cease to do heavy winter pruning. (3) Put into operation a systematic plan of both winter and summer pruning. After establishing the balance of nature, maintain it constantly, permitting the trees to produce only sufficient growth annually to keep the trunks and large limbs in perfect condition, replace any breaks or losses and furnish new bearing wood. This, then, is the ideal condition and if followed up will compel annual fruitage.

The season following a heavy winter pruning is usually one of heavy wood replacement, and I find it very difficult for a bearing tree to produce a large quantity of wood and develop a good crop of fruit buds at the same time, and so, for this reason, where bearing trees require heavy pruning, I prefer to do it just at the close of the summer-growth period. To most people this is summer pruning. However, to those who have made it a study it is only one phase of summer pruning, and that of pruning for fruit production. The plan I find that gives the most uniform results is as follows: (1) During the winter remove all crossing, broken and diseased limbs and do such branch thinning as is absolutely necessary, but never cut back unless it is for the purpose of thickening the top. (2) Just before the close of the growing season (after the fruit buds have begun to show) do the regular pruning, consisting of the removing of crossing, broken and diseased limbs and any necessary topping at this time necessary. I prefer that all limbs removed be taken off close to the limb from which they originate and that no stubs be left. The exact date or even months for all districts this pruning must be done cannot be foretold in advance, since it varies with districts, methods of cultivation, irrigation and varieties. The only accurate way to determine just when a tree should be pruned for fruit is by examining some of the fruit buds of the tree to determine the stage of development of the embryo flower in the bud. Just as soon as the bud shows the least development of the flower, pruning will aid the growth. Too early pruning causes many of the buds that would naturally be fruit buds, but have not developed sufficiently, to expand as fruit buds,

while too late pruning has no effect whatever upon the undeveloped buds. The purpose, then, of summer pruning for fruit is to accelerate the fruit-bud growth and at the same time retard wood growth.

In irrigated districts, immediately after the pruning has had its desired effect of checking growth, which may be shown in from three to six weeks, begin to gradually increase the amount of moisture in the soil until by the last of October the soil is thoroughly saturated. At this time the fruit buds will stand out distinctly, be round pointed and show every indication of vigor. Water applied before growth has been completely checked will cause late fall terminal growth, a condition that may or may not be detrimental to the trees—however a condition not at all desired by the good fruitgrower. The pruning for fruit every year can be briefly summed up in the following sentence: Develop a good frame, produce abundance of fruiting area, check wood growth, strike balance of nature, keep up vigor, feed well, summer prune and irrigate thoroughly at least every autumn.

Bacteria

By E. Leech, Stevensville, Montana

BACTERIA were discovered in 1683. That they do not originate spontaneously was shown in 1860-64. The first disease-producing bacteria were recognized in anthrax in 1849; and the first definte proof that bacteria caused animal disease was by Koch with anthrax in 1875-78. The first plant disease to be definitely ascribed to bacteria was the pear blight in 1879.

Entrance to the host plants is made in various ways, very often through wounds, particularly wounds caused by insects, through roots, stomata, water pores, through delicate tissues as blossoms, etc. Once in the tissue, bacteria may migrate rapidly by means of the vessels, intercellular spaces (between cells) or more slowly through cavities dissolved by the aid of enzymes (an unorganized or soluble ferment).

Typically a bacterial spore consists of a highly refractive ovoid (resembling an egg) walled body within the mother cell. This body possesses high resistance to ordinary stains, a great tenacity against decolorizing if it be once stained, a higher resistance against adverse temperatures and adverse conditions generally than do vegetative cells, and finally the ability to germinate and thus aid in perpetuating the species. While the absolute number of bacterial species that form spores is large, comparatively they are few. They are most frequently met among the rod forms, and are rare among the spirilla and cocci.

There are three modes of spore germination, the most common, polar germination, consists in a rupture of one pole of the spore and the development of a normal vegetative cell through the opening. The second mode, equatorial, consists in a rupture in the side instead of the end of the spore. The third mode, absorption, consists in a direct development of the whole spore into a vegetative cell. In suitable conditions germination may occur immediately after spore formation; if conditions be unsuitable it may be delayed for many years.

American Association of Nurserymen

The Hotel Cadillac, Detroit, Michigan, has been chosen by the committee on arrangements, Mr. Thomas I. Ilgenfritz and Secretary Hall, as convention headquarters for the fortieth anniversary of this association. The accommodations for meetings, exhibits, committees and for social purposes are unexcelled, and have been generously placed at our command by the management. It will be the committee's aim from time to time to keep members posted regarding progress made in the development of all efforts to have the program, general arrangements and entertainment of the very highest quality. What is now asked of members is that they shall become so enthused that they will importune nurserymen who are at present in the cold to become members before the cold storage doors shut them up beyond the possibility of thawing. The convention of June 23-25, 1915, will go down in American Association history as a phenomenal event.—John Hall, Secretary, 204 Chamber of Commerce Building, Rochester, New York.

Pruning and Shaping Young Trees

A. G. Craig, of Deer Park, Washington, before Fruit Producers' Congress, Spokane, Nov. 16, 1914

THIS article is limited to the discussion of pruning and shaping the tree up to five years of age and does not cover the problems of pruning the bearing tree, and is confined almost wholly to apple and pear trees. Most of the thoughts contained in this article are the resulting ideas gleaned by the writer from five years' experience supervising the pruning of 7,000 acres of orchard in one district in Washington and a close study of pruning in the other fruit-growing districts of the Northwest and also of Michigan.

It being universally conceded by fruitgrowers that the low-headed as opposed to the high-headed tree is the more desirable, therefore this article will not discuss the advantages of the low-headed tree. Just how low the heads should be will depend somewhat on the texture of the soil, the variety of fruit and somewhat on the grower. On light soils and upright-growing trees, the first limb of the head may be as low as eight inches from the surface of the soil, and thorough cultivation maintained with extension discs and other wide harrows, so adjusted that the team may walk at considerable distance from the trunks of the trees and still till practically all of the surface soil. But with more heavy soils and trees with spreading habits, or if the grower expects to grow humus crops among the trees that require a plow to turn down, the heads must be high enough so that a plow can be run quite close to the trees.

The important thing in training and pruning an orchard is to get our ideal tree and purpose of the tree correctly fixed in our mind and to make each cut cause the tree in hand to conform more nearly to that ideal. One of the great errors made by the grower is that of changing ideals and methods of pruning. What is accomplished one season is defeated the next by the pruner having a different ideal in mind. A perfect appearing tree from an artistic standpoint is not always the best fruit tree. The trees should be trained so that when they reach the bearing age they have room to raise a good quality of fruit and at the same time have ample wood to bear a heavy load, with as few props and other artificial supports as possible. To accomplish this the pruner should understand the soil and climatic conditions and the nature of every variety of tree in the orchard and prune accordingly. To get a good quality of fruit the tree must be thinned and branches shaped to receive an even distribution of light and air. My ideal tree has a leader or a center trunk, but it is not always possible to get a good leader.

Young trees should be pruned during the dormant period, excepting as treated later in this article under "Pruning the third year." It is best to leave the pruning of tender trees like peach trees, that are apt to freeze back a good deal, until growth starts in the spring, also small trees that require very little time to prune; but the commercial grower who has large orchards should begin in December or even in late November and improve some of the milder days. Most authorities agree that the wounds heal a little better when pruned just before the trees start growth, but apple and pear trees may be pruned at any time during the dormant period, and if so, why not start as soon as the leaves are off so that the operation can be completed early and get the work out of the way so it does not interefere with spring spraying.

The pruner should understand thoroughly the principles and habits of tree growth. To emphasize some of the most important ones I shall put them in the form of questions and answers:

What effect has heavy dormant pruning on a tree?

It stimulates long, heavy wood growth.

What is the difference in the effect of cutting one branch lightly and another branch severely?

The branch cut lightly usually grows stouter than the other, but the new growth on it is not usually so long as the new growth on the branch cut severely. This is one of the most important things to remember in pruning trees.

How can a weak limb on a young tree be strengthened?

Cut it longer than the stronger limbs surrounding it.

Why do we get the desired results by this practice?

The long branches have more buds and, other things being equal, it will produce more leaves, thereby getting more food to increase its diameter.

How can you frequently prevent bad crotches?

By never cutting two closely-attached limbs the same length. Two closely-attached branches of the same size most always are weak at the unions, especially if the angle is narrow. If one branch is cut shorter than the other it gives the long branch the advantage, and when the load comes the two branches are not pulling against each other.

Why do we cut the leader longer than other branches?

To keep it in advance of the other part of the tree and to strengthen it.

So far the article has treated the subject in a general way and given general principles to follow, but let us consider the subject in a little more concrete form.

One-year-old trees are commonly used for planting. I prefer two-year-

old trees, provided I grow them myself and can transfer them directly from the nursery to the orchard without being compelled to have them packed and shipped. Two-year-old trees are easily injured. When one-year-old trees are used the large three to four-foot grade is the best. On larger trees the lower buds are small and weak and frequently no limbs start low enough. The one-year-old trees should be cut off from twenty-four to thirty-two inches from the soil; cutting at this height gives room for three permanent scaffold limbs and the leader from six to eight inches apart. During the first growing season no pruning is necessary, except the buds may be rubbed eight to ten inches from the ground. They are frequently rubbed off too high.

Second Year (trees one year from setting).—The pruning just before the second year's growth starts is the time to select the limbs that are afterward to form the main scaffold limbs. It is important to avoid crotches at this pruning. If nothing but crotches develop, cut all the branches out and leave the center leader. During the second year the dormant buds below will be forced out and will make strong branches at a larger angle from the leader. I wish finally to have three main scaffold limbs leading from the main body arranged in a whorl from six to eight inches apart on the main stems, but I frequently leave four and five branches at this time, the lowest one ten inches to a foot from the ground. The excess branches are to be cut out the third or fourth year. Never allow the main limbs to issue from the same point. The selected limbs should be pruned back from one-half to two-thirds of their length. The central leader should be left from six to ten inches longer than the others. If there is a prevailing wind leave the limb to the windward a little longer than the other limbs.

Third Year (trees two years from setting).—In regions where the wood growth on young trees is large, the tips of the new growth can be cut off the latter part of June or the first of July. (This should be done early enough to give time for branches to make good growth and mature their growth.) Where this is successful a tree with a more perfect balanced head in a shorter period is obtained and almost a year is gained by the practice. It can be repeated again the fourth year, but seldom after that. When this is practiced the three-year-olds are pruned like four-year olds and four-year-olds like five-year-olds. This is the only summer pruning I advocate for young trees, and it is not really pruning, for a very small part of the tree is removed. Choose from two to three limbs which have formed on each scaffold limb and leader and remove all others. Cut back about one-third of growth, care being taken to avoid crotches.

The Fourth Year (trees three years from setting).—Choose from two to three limbs which have formed on each of the branches left the third year and remove all others, excepting a little of the weak wood growth low down on the trees. Cut back less than one-third of the growth. Cut out all but three scaffold limbs.

Fifth Year (trees four years from planting).—The first process should be the same as the fourth year, except more of the weak branches should be left in the lower part of the tree to furnish early-bearing wood, to be removed after it has served its purpose. When a tree becomes four years of age the cutting back should be stopped and only such of the limbs as grow stronger that the rest should be cut back; also such trees as have too thin tops should be cut back sufficiently to make them stocky and rebranch to make the necessary amount of bearing wood. When cutting back is done, to avoid a tree throwing out a number of sharp forks, the cuts should be made only to small side limbs.

Kitchen Most Important Room in Farm House

[Office of Information, United States Department of Agriculture]

THE importance to the farmer of having an economical farm house has been emphasized by the farm architect of the Department of Agriculture, who states that the mental and physical fitness of the laborers, both within the house and in the fields, are vitally affected by the building that affords the family shelter. The average American farm house has failed to share in the improvements that are every day being made in agricultural conditions and, according to the architect, is a rebuke to our boasted civilization. Relatively, he says, the housewife of a century ago with her fireplace cooking and log cabin was better provided for than is the housewife today.

The most important building on a farm is the home. The health, comfort and happiness of the family are dependent upon its construction and equipment, and unless these matters are looked after the sanitary dairy barn or the economically constructed buildings for stock are of little value. Happiness and contentment in the family are as essential to efficient service as improved tools and outbuildings. Although the housewife spends, in many cases, a lifetime in her "workshop," the kitchen and the family rooms, she is not, as a rule, capable of planning a house in the highest degree serviceable and comfortable without assistance. Her help, however, is essential to the farm architect, as the result of his plans most vitally concerns her.

In 1910 a Western farm paper, at the suggestion of the Department of Agriculture, conducted a competition for farm-house plans. About 660 plans of farm houses were submitted, not one of which was fully satisfactory. The larger number insisted on some particular pet notion and emphasized a single feature to the neglect of other important ones. The men and women who familiarize themselves with the work to be done and then apply themselves to the single task of devising means are the ones who, with the cooperation of the farmers and their wives, can best handle the farm-house problem. One of the most important details regarding the average American farm house is that it must be inexpensive. The average annual net income of a farmer today, after deducting five per cent interest on his investment, is something less than $400. This does not mean that the houses may not be attractive. They may, if intelligently planned with the help of vines, shrubs and trees, become the prettiest spots in the landscape, and more beautiful and inexpensive than the crowded city houses. The tenant-house problem is growing in importance, as can be seen from the fact that the number of rented farms increased by more than 324,000 during the last decade. Today little

more than half the farms in this country are operated by the owners.

The possible economy in household labor and the conservation of the strength of the housewife are two important factors to be considered in the construction of a farm house. Pleasant and comfortable farm homes tend to hold families together; but the cheerless, unlovable and insanitary houses drive boys and girls to the cities. Investigation of prisons, insane asylums and houses of correction seem to prove the fact that the sins which account for the existence of these institutions are often bred in inadequate and unhappy farm homes. So this social aspect of the problem is considerable. The public is awakening to the fact that better farm houses are needed, and the special feature which many farm papers now issue as a "House-Building Number" proves its interest to thousands of readers. The Office of Farm Management of the Department of Agriculture has now undertaken to investigate this problem systematically and to evolve, if possible, practical improvements for the benefit of the farmer's home.

Certain features are often overlooked in providing economical arrangements for the household when they might be easily provided for. One of the specialists of the Office of Farm Management learned from a woman in Pennsylvania, who had broken down from overwork, that she had been carrying coal from the barn for years. When the husband was asked if there was any reason why a coal bunker could not have been provided near the cook stove and filled directly from the wagon, he answered that there was none, but that no one had ever thought of it. This one detail has been found neglected in other cases where it could have been easily remedied if only someone had thought of it.

After economy in the construction of the building and in the housework has been attained, attention will be given to developing beauty. Simplicity in line and good proportions are meant by the use of this word beauty, and not so-called applied "ornaments." This simplicity is entirely in keeping with a general plan of economy. Economy, however, is not a synonym for cheapness. Double-strength glass may even be more economical in a tenant house than single strength, notwithstanding its greater first cost. A kitchen sink may be a paying investment, although it excludes a bay window or a fireplace, which has been the pet notion of the housewife. Screened-in kitchen porches, sleeping porches, double or triple windows and kitchen conveniences are fine economical features which even the smallest house plans may well consider. Separate dining rooms for families that generally eat in the kitchen are less important, as are "parlors." These separate rooms may have complete systems of plumbing, heating and lighting which involve additional expense. The kitchen is the most important room in the farm house. For the average farmer, economy bars a room especially reserved for weddings and funerals. A back stairway in small houses is an unnecessary luxury. Large halls which are never used to live in, but merely as thoroughfares, are a feature which can be dispensed with in the interest of a smaller outlay of money.

Other features that should give way to a comfortable and convenient kitchen are narrow porches, filigree work, numerous angles in walls and roof, useless doors. There should be an intelligent purpose for every cubic foot of space and for every piece of material about the building, if possible. It may not be found practicable for the Department of Agriculture to furnish plans and specifications of farm houses worked out for particular individual needs. However, it is believed to be desirable to work out plans and specifications for the general needs of farmers, and to illustrate and explain the plans so that the farmer may understand the principles involved and apply them when he remodels his present house. The Office of Farm Management is endeavoring to help the farmer and the farmer's wife along these lines.

California Fruit Growers' Exchange

By G. Harold Powell, General Manager, Los Angeles, California

THE California orange and lemon crop equals 50,000 carloads, or about 20,000,000 boxes. There are between 10,000 and 12,000 growers engaged in the culture of the fruit. Four-fifths of the growers are organized into co-operative associations, more than 60 per cent of which are federated into the California Fruit Growers' Exchange. The California Fruit Growers' Exchange is an organization which acts as a clearing house in providing the facilities through which 6,500 growers distribute and market their fruit. There are three foundation stones in the exchange systems—the local associations of growers, the district exchanges and the central exchange. The local associations, the district exchanges and the central or California Fruit Growers' Exchange are organized and managed by the growers on a non-profit co-operative basis, each of them operating at cost, and each distributing the entire net proceeds to the growers after operating expenses are deducted.

The California Fruit Growers' Exchange comprises 115 local associations, each of which has from 40 to 200 members. The growers usually orgaize as a corporation without profit, under the laws of California, issuing stock to each member in proportion to his bearing acreage, to the number of boxes he ships, or in equal amounts to each grower. The association assembles the fruit in a packing house, and there grades, pools, packs and prepares it for shipment. The associations are managed by a board of directors through a manager and are conducted exclusively for the benefit of the growers. They declare no dividends and accumulate no profits. The fruit is pooled each month, or in a shorter or longer period, each grower receiving his proportion of the proceeds received for each grade shipped during the pool. Many of the associations pick the fruit, and some of them prune and fumigate the trees for the members. Each association has brands for each grade, and when a carload is ready for shipment it is marketed through the district manager, of which the association is a member, through the agents and facilities provided by the California Fruit Growers' Exchange.

There are seventeen district exchanges. These exchanges are corporations without profit. There may be one or more district exchanges in a community, depending upon the number of local associations and other local conditions. The district exchange acts as a clearing house in marketing the fruit for the associations through the California Fruit Growers' Exchange, and acts as a medium through which most of the business relations between the exchange and the local associations are handled. The district exchange orders cars and sees that they are placed by the railroad at the various association packing houses; keeps a record of the cars shipped by each association, with their destinations; informs itself, through the California Fruit Growers' Exchange, of all phases of the citrus marketing business; places the information before the asscoiations; receives the returns for the fruit through the central exchange and returns the proceeds to the associations.

The California Fruit Growers' Exchange is a non-profit corporation under the laws of California. It is formed by seventeen district exchanges, with a paid-in capital stock of $1,700. It is managed by a board of seventeen directors through a general manager, one director representing each district exchange. The function of the California Fruit Growers' Exchange is to furnish marketing facilities for the district exchanges at a pro rata share of the cost. The exchange places bonded agents in the principal markets of the United States and Canada, defines the duties of the agents and exercises supervision over them. It gathers information through them of conditions in each market, receives telegraphic advices of the sale of each car and furnishes the information every day in bulletin form to the local associations. The exchange business is on a cash basis; it makes prompt accounting of returns to the growers through the district exchanges; it takes care of litigation that arises in connection with the marketing of the fruit; handles all claims; conducts an extensive advertising campaign to increase the demand for citrus fruit; develops new markets and performs such other functions as are set forth in the contract between the central exchange and the district exchanges. The central exchange levies an assessment against each district exchange for a pro rata share of the expense on the basis of the number of boxes shipped. It declares no dividends. It does not buy or sell fruit or any other commodity, and exercises no control, either directly or indirectly, over sale or purchase. Its function is to provide facilities for the distribution and marketing of the fruit for those shippers who desire such facilities. Under the exchange system every shipper reserves the right to regulate and control his own shipments; to develop his own brands of fruit; to use his own judgment as to when and in what amount it shall be shipped, to what

markets it shall be shipped and the price he is willing to receive, reserving the right of free competition with all other shippers, including the members of the same organization, uncontrolled by anyone. The agent in the market acts directly under the order of the shipper, who determines the prices at which each car shall be sold outside of the auction markets, and all other matters connected with its distribution, the California Fruit Growers' Exchange acting as the medium through which orders pass from the agent to the shipper, but never selling a car or determining the price at which the fruit shall be sold.

The exchange is a democratic organization; the growers exercise control over all matters. Membership in the exchange is voluntary; a grower may withdraw from an association at the end of a year; an association may withdraw from a district exchange and a district exchange may withdraw from the central exchange; these relations being set forth in the various contracts that hold the members together. There is no attempt on the part of the central exchange to regulate shipments, to eliminate competition, divide the territory or business or to influence prices. In this connection its functions are to keep the associations informed daily regarding the shipments from the state; the general movement of exchange cars, the general conditions of the different marketing points; the prices at which the exchange fruit is sold, and in furnishing such other information as will allow the growers and shippers, through their association and district exchanges, to decide the questions of distribution and marketing for themselves. One-third of the entire shipments are sold at public auction, the remainder through unrestricted private competition. There is no uniformity in price in the different brands, because the fruit in each section, on account of soil and other local differences, has an individuality of its own, and every brand sells on its own merits.

The exchange is organized into several divisions: Sales, legal, traffic, advertising, insurance and mutual protection, and a supply department which furnishes the materials used in the packing houses and on the ranches at cost to the members. The exchange does not consign fruit. It is shipped on order; sold f.o.b. or sold "delivered, subject to usual terms." The exchange maintains district managers in all of the important cities of the United States and Canada. These employes are exclusively salaried agents engaged only in the sale of fruit, in the development of markets and in handling the local business problems of the exchange.

A New-Old Label Concern

Mr. E. Shelley Morgan, who for the past twenty-five years and more has been engaged in the label business, representing a large concern, has associated himself with the Simpson & Doeller Company, Baltimore, Maryland, with headquarters in Portland. He will have charge of their business throughout the Northwest territory. Mr. Shelley Morgan is well known among the apple growers and cannery men of the Northwest, having been a pioneer in the label business in this field. Mr. Shelley Morgan is an apple grower owning a large orchard in Hood River, and is highly popular with the apple growers all over the whole country. His many friends wish him success in his new venture.

To Remove Fruit Stains

Alcohol softens most fruit stains, especially if it is warmed over hot water. Soaking in milk also helps. After softening the stain pour boiling water through the cloth. Dampened powdered starch applied instantly will take out almost any fruit stain from wash goods if left several hours.

Some fruit and wine stains, especially those of apple and pear, and some clarets are very difficult to remove. If they are boiled gently (after soaking) in some strong borax and water, well rinsed, then hung out dripping wet in the sunshine, or during a frosty night, the stains will usually disappear.

Winter Rhubarb

In the winter time fresh vegetables are very scarce and when obtainable are very expensive, as they are grown in hothouses. Winter rhubarb is being successfully grown by J. B. Wagner, of Pasadena, California. It is claimed that the variety is strong and vigorous and does well even in climates that are very cold. It is also stated that this rhubarb does best on warm and well drained soils. Irrigation apparently is necessary in dry climates, but in the Northwest where rain is so plentiful it would seem that this variety could be grown without irrigation.

Blackberries and Loganberries

By Miss Laura E. Barlow, Sebastopol, California

BLACKBERRIES have been grown in the Sebastopol district of Sonoma County since 1872, and it has been proven that a sandy-loam soil, together with moist cool summers, fanned by the coast breeze, and an abundance of winter rains, make it a most favorable locality for berry growing. Our principal varieties are Lawton blackberry, Mammoth blackberry and the loganberry, of which the blackberry is the most extensively grown in our locality and more than doubles all other varieties. It is a very long-lived berry and its adaptability has been proven by the test of time. There are some of the oldest vines still standing and bearing well, with no pest of any kind to molest them. The Mammoth blackberry is a cross between the California dewberry (or wild blackberry as it is commonly known) and Crandall's Early, and the loganberry is a cross between the California dewberry and the red raspberry.

In planting the Lawtons the plants are obtained by digging the shoots that sprout up late in the summer between the hills. These plants are dug with a good cross root from three to four inches long. This is a plant which should be looked after very carefully, so as to insure a fine, strong growth when planted. These are upright growers and are planted eight feet apart each way. With one-year-old vines one stake is used, and two the second year. These are six feet in length and are driven one on each side of the vine, close in but spreading at the top, to allow for lateral growth and ease in picking. The pruning does not amount to much the first year, but in the spring of the second year the tender shoots that are thrown out are only allowed to grow about four and one-half feet high. Then the top is clipped off, which causes them to throw out laterals, and these are cut back to the length of from six to eight inches, and hold the berries for the coming year. The old wood is taken out each fall and the new canes, after being pruned, are tied firmly to the stakes and are ready for the spring cultivation to commence.

The Mammoth blackberry and the loganberry have met with much favor in our locality, coming in very early in the season, and are off before our Lawtons ripen. Their adaptability to our soil and climate has given them a wide planting, and their vigorous growth and prolific bearing has made them favorites among our growers. The Mammoth blackberry is in full fruiting at the time the logans begin to grow light and the Lawtons are beginning to ripen, thus giving us a continuous succession of Logan, Mammoth and Lawtons for a season of about three months. The Logan and Mammoth are running vines and must be trellised.

This is done in the winter, two wires being used, one above the other, about two and a half feet and three and a half feet above the ground. The plants from these varieties are grown from "tips," which means putting a trowel full of soil on the tip of the new growth after the first rain in the fall, causing it to take root, and by spring these are ready for planting. Thorough cultivation is very necessary in the raising of fine berries. The ground should be plowed four times, that is away from vines both ways, then back again (after the hoeing has been well done), with a thorough harrowing after each plowing. As we do no irrigating, this leaves our ground light and mellow, and is able to hold the moisture during the warm summer days.

Our berries are all sold through our Sebastopol berry growers' association, which was organized in February, 1909, under the name of the Sebastopol Berry Growers, Incorporated. We had our ups and downs the first year, but we all held together and have been very successful in marketing our berries to good advantage. It has caused number one fruit to be put on the market, has opened up good Eastern markets and relieved our home supply so the canneries are able to pay us a good price for our surplus. And I must not forget to mention our dried berry market, which we have been working up by sending from one-half to one carload out each year, and are now beginning to have many inquiries for our dried article, which is a very fancy grade. Our shipping berries (excepting a few which supply our northern towns) are shipped to Eastern markets; we are now sending out several carloads a week. These are all packed in one-pound baskets, and there are twenty-four to a crate. Then they are delivered to our warehouse, pre-cooled and loaded into iced cars, and are then ready for shipment. The cannery takes our surplus, which are picked in five-pound trays and delivered in chests of twelve and twenty trays each.

I will here give some of our rules, which are very important in the harvesting of our berries: (1) Never pinch a berry so as to crush it. Practice the light-fingered art, and never let a berry bleed. (2) Berries should be broken from the stem, not pulled. (3) All ripe berries to be picked clean each time, as they spoil your next picking. (4) Never touch a berry but once. (5) Never allow any leaves or stems in your basket and throw out all crushed fruit. (6) Fill your baskets as full as possible, so they will not crush against the lid of the crate. (7) Do not pick berries when a heavy dew is on them. Take pride in your work and be a workman that need not be ashamed to put every box on exhibition as one of the most beautiful fruit creations of nature cultivated by man.

Pruning An Art, Etc.

Continued from page 10

however, upon the varieties and climatic conditions. Then by pruning the trees they will proceed to put out a correspondingly greater number of fruit spurs for the next season's crop. If you prune in summer during the vigorous growing season, particularly the latter part of it, you will be liable to get a paint-brush effect at or near where you make your cutting. There will only be about a month's time during which you can get the result sought in summer pruning, and that time starts, as stated, after the terminal buds are well developed. If you intend to do summer pruning, do not prune in the spring. Except this. You can cut off terminal limbs and branches in the spring and benefit your trees by doing it, but you must not cut off these terminal branches when doing summer pruning. That is one thing you must not do, for the reason, as I have told hereinbefore, the fruit depends upon the leaves for size, texture and flavor. Now if you cut off these terminal branches, you defoliate the tree to just that extent and the fruit on that part of the branch which is left will be deprived of the necessary nourishment to mature it. Let your work be the removal of entire branches and sublateral limbs. In other words, a thinning out of the body of the tree, and you will get the effect desired if the work is done at the right time. The forcing of fruit production by summer pruning is being practiced more and more as the years go by. Growers are getting out of the "landscape-garden" orchard idea, for when they can make their orchard produce as much in twenty years as it otherwise would in forty years, which it will do with proper pruning, they practice it, pocket the profits, dig up the old orchard when it ceases to be productive and set out a new one.

There is one more thing I want to mention, and that is the so-called "watersprouts." Generally, whenever a tree has been severely pruned, a large number of sprouts will start out from the body or framework of the tree. It is safe to presume that a large majority of these sprouts have grown from what is termed "adventitious buds," that is, buds that have been "produced out of normal and regular order" by a superabundance of vitality in the body of the tree, caused by the heavy pruning. For the reason that some of these sprouts grow very rapidly and late in the season, their wood is soft and the buds on them are sometimes not well developed, is perhaps the reason why they are called "watersprouts." I have pruned and developed limbs that produced fancy fruit from these despised sprouts. I have made top-grafts and root-grafts from watersprouts, the buds of which were very poorly developed, and which made as good a growth as any of the grafts. So if you can use any of these as a limb to fill up an open space in a tree to which you can direct it by cutting the proper bud do so. Of the bal-

ance save one every six or eight inches, which clip off just above the third or fourth bud, and all the rest cut off close up to the limb. Those saved will put out fruit spurs and bear fruit. Never cut off fruit spurs from the large limbs of an apple tree, for some of the largest, finest-flavored apples grow on these spurs.

Pears, cherries and all the plum family require about the same treatment in pruning as apples, except that if the pruning is properly done and they are kept in good form up to the time they are four or five years old, these fruit trees will require little or no pruning thereafter. With pears, cut off all fruit spurs from the main branches in the body of the tree. This is done to prevent pear blight from being started in the body of the tree, as insects carry the infection to the blossoms, and if there are any blossoms permitted on these large limbs and infection takes place, it means the destruction of all that part of the tree. Peaches and almonds require more severe pruning to get the best results. The fruit is formed upon one-year-old wood. They are vigorous growers and it is up to the pruner to keep his trees down and at the same time with sufficient new wood growth upon which to form the next year's crop of fruit.

Concentrated Apple Cider

The specialists of the fruit and vegetable utilization laboratory of the Department of Agriculture have completed arrangements for a commercial test of the recently discovered method of concentrating apple cider by freezing and centrifugal methods. As a result, a cider mill in the Hood River Valley, Oregon, will this fall undertake to manufacture and test on the retail market 1,000 gallons of concentrated cider, which will represent 5,000 gallons of ordinary apple cider with only the water removed.

The new method it is believed makes possible the concentrating of cider in such a way that it will keep better than raw cider and also be so reduced in bulk that it can be shipped profitably long distances from the apple-growing regions. The old attempts to concentrate cider by boiling have been failures because heat destroys the delicate flavor of cider. Under the new method nothing is taken from the cider but the water, and the resultant product is a thick liquid which contains all the apple juice products and which can be restored to excellent sweet cider by the simple addition of four parts of water. The shippers and consumers, therefore, avoid paying freight on the water in ordinary cider. In addition the product when properly barreled, because of its higher amount of sugar, keeps better than raw cider, which quickly turns to vinegar. The process, as described by the department's specialists, consists of freezing ordinary cider solid. The cider ice is then crushed and put into centrifugal machines such as are used in making cane sugar. When the cider ice is whirled rapidly the concentrated

juice is thrown off and collected. The water remains in the machine as ice.

At ordinary household refrigerator temperatures this syrup-like cider will keep perfectly for a month or six weeks, and if kept at low temjeratures in cold storage will keep for prolonged periods. At ordinary house temperatures it will, of course, keep a shorter time. To make the concentrated syrup the cider mill must add to its equipment an ice-making machine and centrifugal machinery, so that the process is not practicable on a small scale. The specialists are hopeful, however, that the commercial test soon to be inaugurated in Oregon will show that it will be possible for apple growers to concentrate their excess cider and ship it profitably to the far South or to other nonproducing regions. The specialists also believe that it will enable apple producers to prolong the market for cider.

Remedies for Potash Shortage

Various suggestions have been made in regard to the steps to be taken by farmers in reference to the shortage of potash in their fertilizers, caused by the greatly reduced shipments of potash from Germany since the first of August. Most of the fertilizer companies have endeavored to make the potash on hand go as far as possible by selling for the present brands of complete fertilizers containing only two or three per cent potash and withholding from sale brands containing larger amounts. The suggestion that some or all of the potash be replaced by phosphoric acid is absurd, for every schoolboy knows that one plant food cannot take the place of another. There are some indirect fertilizers, such as lime, gypsum and salt, that can release a limited amount of potash from some soils that contain hydrated silicates of alumina and potash. But if these soils have already been treated with lime or have received repeated dressings of the usual forms of fertilizer containing soluble phosphate with its accompanying gypsum, then the potash in the hydrated silicates has to a large extent already been replaced, and the use of more lime or gypsum or salt could not be expected to release much additional potash. Ground limestone or oyster shells act too slowly to be used as potash releasers.

The residue of soda left in the soil by nitrate of soda is more effective in releasing potash than is gypsum, and hence goods in which the nitrogen is largely in the form of nitrate of soda may have a special value in the present emergency. It is often stated that decaying organic matter releases potash from the soil, but there seems to be no direct evidence of this. On the contrary, Dr. S. Peacock states in the American Fertilizer of September 5, 1914: "Several thoroughly competent researches have shown that decaying organic matter has little effect on converting inert mineral plant food in the soil into available form."

In any soil, the amount of potash capable of being released by these indirect means is a very small fraction of the total potash in the soil, most of which exists in a form about as soluble as window glass. There is no known profitable method for rendering this inert potash of the soil available fast enough to provide for profitable crops. Whatever temporary expedients we may employ in the present emergency, we must keep in mind that the potash thus removed from the semi-available soil reserves must later be replaced if we are to maintain the soil's productiveness. There is danger in the statement that farmers have been using an excess of potash. Crops use on the average about two and one-half times as much potash as phosphoric acid, while the average fertilizer sold contains only half as much potash as phosphoric acid; yet no one claims that we are using too much phosphoric acid. The potash remaining from previous fertilization is practically nothing, except in the limited areas where a ton or more of fertilizer has been used per acre on truck crops. Very rarely is half as much potash applied to the wheat, oats, corn or cotton crop as the crop removes. The potash mines are so numerous and the stocks on hand so large that supplies can be promptly sent forward as soon as European conditions permit freight shipments to be resumed.—H. A. Huston.

Failure of Blossoms to Fruit

The failure of orchard trees to set fruit, in spite of the fact that an abundance of blossoms was produced, is due to one or more of several causes. These are as follows:

1. Self-Sterility. Many varieties of apples and pears are self-sterile. That is, they are not capable of setting fruit properly unless pollen from another variety is used. For example, Bartlett and Kieffer pears, in many localities, when planted in solid blocks, give less satisfactory results than when they are planted with such varieties as Duchess, Lawrence and Anjou. With apples and pears it is good practice to mix varieties. However, if varieties with proper affinities are selected, one variety to furnish the pollen is as good as a number.

2. Frozen Pistils. The pistil, which is the part of the flower to develop fruit, is more easily frozen than other parts of the flower. Hence the pistil may often be frozen while other flower parts are not affected; consequently blossoms are formed but fail to set fruit.

3. Weak Trees. Trees in a weak condition, although blooming abundantly, often fail to set fruit.

4. Rain and Snow. The pistils may be mechanically injured and the pollen washed away by rain or snow at the time when blossoms are open.

5. Excessive Growth of Wood. Blossoms often drop in great numbers when the tree is forming excessive amounts of wood.

6. Over-abundance of nitrogen fertilizers.

7. Diseased buds.

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8. Spraying. Heavy spraying of trees, especially before pollination, has in some few instances resulted in a loss of blossoms. This is not serious, however. —W. W. Robbins in "The Fruit Belt."

Loganberries

Loganberries designed for marketing fresh, for canning or for evaporation purposes are best when picked at the hard-ripe stage, just as the berries are beginning to turn black. When it is necessary to begin earlier than this and pick the berries before they reach this stage they may be used with a fair degree of success for making jelly, and when it is not possible to pick them fast enough to prevent them from passing the hard-ripe stage they will be found to be at the best stage for making jells, juices and jam. Finally, berries that cannot be cared for until they become moldy, provided they are not actually decomposing, may be made into heavy syrups for confection and flavoring purposes. By thus taking every advantage of the different stages of maturity of the berry crop and by beginning as early as possible and continuing the operations as long as necessary, it is often possible to save and use to the best advantage the entire crop. These conclusions concerning the best use of the loganberry were reached in a series of experiments conducted by Prof. C. I. Lewis and assistants at Oregon Agricultural College. Aside from the information as to the best stage for picking berries the laboratory tests have developed methods of procedure in picking, transferring and manufacturing loganberries with the least expenditure of time and with the minimum loss of fruit.

Three points particularly emphasized by Professor Lewis in picking the berries are that they should be picked early in the morning while it is cool, they should be taken from the vine with a slight twisting motion of the wrist rather than pulled straight from the stem, and the picker should not hold too many berries in his hand at one time. Loganberries picked in the cool of the day were shown to evaporate with better weight and form than those picked in the heat. It was also shown that juice extracted from loganberries when they were cool is less affected by fermentation than when taken from berries that are warm. Indeed it is recommended that if it is impossible to gather the entire picking in the forenoon that those berries picked in the afternoon be stored in a suitable place until the next morning, when the juice will be extracted more satisfactorily. When the berries are picked by a straight pull they are frequently damaged by lateral pressure of the fingers in holding them, and also frequently come away with more or less stems and leaves attached. A gentle twisting motion avoids both of these difficulties, so that the berries are firm, entire and free from trash. Berries, especially when they are ripe, melt down and lose form rapidly when held in the hand. This evidently is due

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both to the warmth of the hand and to the increased pressure that results from trying to get too many berries crowded into the hand at one time. It is far better for the picker to take but few in the hand at once and drop them frequently into the hallock or basket used in picking.

Concerning equipment for picking, the square wooden boxes with elevated bottoms, which provide ventilation and prevent crushing, are to be preferred. A tin-topped basket with tapering sides fails to provide for the ventilation and protection of the berry. For removing the fruit from the field, push carts with adjustable wheels are recommended. These carts can be pushed along between the rows where it will be very convenient to deposit the trays of fruit as rapidly as they are filled. Where berries are grown on a small scale the trays may conveniently be carried from the field. In transferring the berries from the field to market, soft-springed, well-balanced wagons are recommended. It has been found that if the berries are properly picked, put into suitable receptacles and handled with suitable care and regard to the nature of the fruit, they can be transported even a distance of eight or ten miles and still arrive in a first-class condition.

The facts upon which the foregoing conclusions are based will be given to the growers in more detailed form at a later date. It is sufficient at this time to say that the sugar content of the berry rises rapidly at the ripening stage, and that the acidity content lowers in an almost equal ratio. The sugar content of the red loganberry is slightly above three per cent, while that of the dead-ripe berry is about six and one-half per cent. The acidity of the berry when red is more than two per cent, while that of the berry in the dead-ripe stage is a little over one per cent. The pectin content also rises rapidly as the berry ripens. By taking advantage of the results ascertained in these extensive tests it should be easily possible for the grower to care for his entire crop without waste and at the same time market his fruit in the most profitable form.

European Shipments

With respect to Europe, exporters are urged to carefully watch the movement and assure themselves of steamer space and a demand on the other side before making shipments. Latest announcements of steamship companies are to the effect that fairly regular schedules will be maintained between America and the United Kingdom. American apple shippers are advised to stimulate the demand and increase their shipments to Latin America and the Orient. It is suggested that by co-operating with the Department of Commerce, extension of trade in this respect can be accomplished. Inquiries relating to these countries should be addressed to the Bureau of Foreign and Domestic Commerce, Washington, D. C. Shippers are urged to apply to the Superintendent of Documents, Government

Printing Office, Washington, D. C., for the following publications, issued by that bureau, which may be secured at the prices shown: Special Agents' Series, No. 62, 30 cents; No. 72, 10 cents, and No. 81, 25 cents; Special Consular Reports, No. 62, 10 cents, and Tariff Series, No. 19a, 5 cents.

Fruit Production in Australasia

The following table gives the estimate of the Fruit World of Australasia of the 1914 crop of apples produced in the different districts and shows, comparatively, the actual productions of 1912 and 1913. It will be remembered that Australasia is in the Southern Hemisphere, with seasons opposite to our own, their winter being our summer and vice versa The first steamer carrying apples from Australasia is booked to sail therefrom about February 14th, arriving in London about the first of April. It will be seen that about six weeks are required for the trip. The fruit is, of course, shipped entirely under refrigeration:

	1912 Boxes	1913 Boxes	1914 Boxes
Tasmania	822,740	550,188	760,000
Victoria	305,518	384,483	400,000
South Australia	188,965	44,572	190,000
Western Australia	65,205	71,255	60,000
New South Wales	7,213	8,703	2,000

Cement-Coated Nails

A company in Boston, Massachusetts, has obtained a patent on coating wire nails with an asphaltum cement which greatly increases their holding power. Most of the wooden-box factories use these nails, and they are also especially desirable for nailing flooring, siding, etc. The following table gives the comparative adhesive resistance of common smooth wire nails and cement-coated nails:

	Diameter inches	*Length inches*	*Adhesive Resistance*
10d common			
Smooth	.145	2½	167 lbs.
Coated	.117	2½	418 "
8d common			
Smooth	.132	2	198 "
Coated	.112	2	316 "
6d common			
Smooth	.097	1⅝	106 "
Coated	.092	1⅝	226 "

All nails were driven into the same piece, perpendicular to the grain of the wood. All nails were left with their heads projecting one-quarter inch.—H. J. Wilson, Colorado Agricultural College, Fort Collins, Colorado.

Breaking Up "Plow Sole"

Plow sole, the tough, impervious layer just beneath the customary plow depth, must be broken up before drainage can be effected, says Ira A. Williams, ceramist at the Oregon Agricultural College, in discussing drainage. The action of roots in seeking to penetrate this layer should be aided by deep plowing, sub-soiling and use of clover, vetch and alfalfa, which have power to force their way into very refractory soils. The deep plowing should be done when the ground is dry, either in summer or with the beginning of the first fall rains. If the sub-soil comes up in big lumps so much the better for the purpose. This will bring soil into

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productive tilth all the sooner. The sole was caused by repeated plowings for many years, during which time the horses puddled the stratum with their walking up and down the furrows when the ground was soft, year after year. It requires much work to break up the stratum, but the resulting added crop production will soon repay the cost.

Books on Horticulture

Published by the Pacific Horticultural Correspondence School, 306 Stock Exchange Building, Portland, Oregon. For sale at following prices, paper binding, postpaid on receipt of price. Mention "Better Fruit" when remitting.

Practical Control of Apple Diseases and Pests. A. L. Melander, B.S., M.S., Head Dept. Zoology, Washington State College. 44 pages. 50 cents.

Planting Fruit Trees. H. C. Atwell, ex-president Oregon State Horticultural Society. 22 pages. 25 cents.

Care and Cultivation of the Orchard. (a) W. K. Newell, president Oregon State Board of Horticulture. 14 pages. 20 cents. (b) J. R. Shepard, ex-vice president Oregon State Horticultural Society. 7 pages. 10 cents. Both for 25 cents.

Grading and Packing Fruits for the Market. A. P. Bateham, ex-president Oregon State Horticultural Society and vice president Northwest Fruit Exchange; John M. Carroll, for four years in charge of packing school National Apple Show. Includes packing of apples and prunes. 16 pages, 6 illustrations. 25 cents.

Handling and Pre-Cooling of Fruits for Transportation. A. V. Stubenrauch, Field Investigations in Pomology, U. S. Department of Agriculture. 27 pages. 50 cents.

Irrigation Practice. W. L. Powers, M.S., professor Irrigation and Drainage, O. A. C. Many valuable tables of water measurement, amount needed, etc. 78 pages, 8 illustrations. 50 cts.

Water Rights. John H. Lewis, C.E., LL.B., State Engineer, president Board of Control of Water Rights, Salem, Oregon. 16 pages. 20c.

Apple Growing. W. H. Lawrence, A.B., M.S., Horticulturist and Plant Pathologist formerly with Washington State College, now Horticulturist Arizona Experiment Station. 31 pages. 50 cents.

Pear Growing. C. E. Whisler, president Oregon State Horticultural Society. 13 pages. 25c.

Pollination. E. J. Kraus, B.S., Research Assistant in Horticulture, O. A. C. 15 pages. 35c.

Orchard Heating and Frost Prevention. R. S. Herrick, B.S., Field Horticulturist Colorado Agricultural College. 11 pages. 25 cents.

Small Fruits. Fred T. Burglehaus, expert small fruit grower. 16 pages. 25 cents.

Loganberry Culture. Britt Aspinwall. With recipes by Professor C. I. Lewis for loganberry juice. 16 pages, 3 illustrations. 25 cents.

Prune Growing. H. S. Gile, Secretary Willamette Valley Prune Growers' Association. 6 pp. 10 cents.

Cherry Growing. J. R. Shepard, ex-vice president Oregon State Horticultural Society. 7 pages. 10 cents.

Directions for Orchard Spraying. H. S. Jackson, Plant Pathologist, and H. E. Wilson, Entomologist, O. A. C. Free with any order of 35 cents or more. 8 pages. 10 cents.

Walnut Growing. Ferd Groner, walnut grower. 9 pages. 15 cents.

Co-operation Among Fruit Growers. E. H. Shepard, Editor "Better Fruit." 8 pages. 10c.

All of the above booklets, in paper covers, will be sold for $3.00, if ordered at one time; but costing $4.90 is ordered separately.

The following booklets are also in course of preparation by the authors. The exact price cannot be stated for each until received, but will be approximately 75 cents each and will contain from 50 to 100 pages each.

Orchard Insect Pests and Methods of Control. H. F. Wilson, M.S., Entomologist Oregon Agricultural College. About 100 pages, illustrated. 75 cents.

Fungous and Bacterial Diseases of Fruits and Their Treatment. H. S. Jackson, A.B., professor of Botany and Plant Pathology, Oregon Agricultural College.

Choosing an Orchard. C. I. Lewis, M.S.A., head Department of Horticulture, O. A. C.

Soil Fertility and Fertilizers. Herman V. Tartar, B.S., Chemist, O. A. C.

The complete set of above booklets will be sold for $5.00. The new booklets to be mailed as soon as published.

Hard times cannot be cried down by shouting, but they can be beaten down and driven off by everyone lending a helping hand and showing the way over from the dark side to the bright side.

Remember that every dollar this country had a year ago or five years ago it has today. We have not been drained of our resources. Our factories have not been burned down, our young men have not been killed in tens of thousands, we have not lost thousands of millions in trade, but on the contrary shall gain trade. All we need is to attend to our business, produce, sell, buy of each other, stop pessimistic talk and we shall have all the prosperity we want and possibly more than we deserve.

STEINHARDT & KELLY

Herewith Proclaim Their Unshaken Faith in the American Apple

The 1914 crop of apples is being harvested under conditions that have no parallel in the past. There has probably never been a larger crop, our export outlets have been blocked, money is at unheard-of premiums, if obtainable at all, the growers and the trade are all at sea.

Nevertheless **STEINHARDT & KELLY** are placing contracts for choice blocks of Western box apples from the famous growing districts. They have contracted for approximately

650 CARS

already and are steadily buying more for storage.

Apples will be paying property this year as in the past. Nothing but lack of confidence makes the 1914 situation different from that in other years.

STEINHARDT & KELLY have been handicapped by as much uncertainty as anybody else, but now, after a careful study of conditions and prospects they are carrying out a conservative but confident policy and take this method of publishing their confidence for the encouragement of the apple trade and apple industry.

The crop now being harvested represents eight to ten months of anxious work by the producers of fine apples. Without distribution growers cannot continue to produce. It is now the duty of the trade to back the growers loyally. Old antagonisms must be dropped on all sides, old fallacies about the "superfluous middleman" must also be forgotten and the foundations laid for a bigger and a more glorious future.

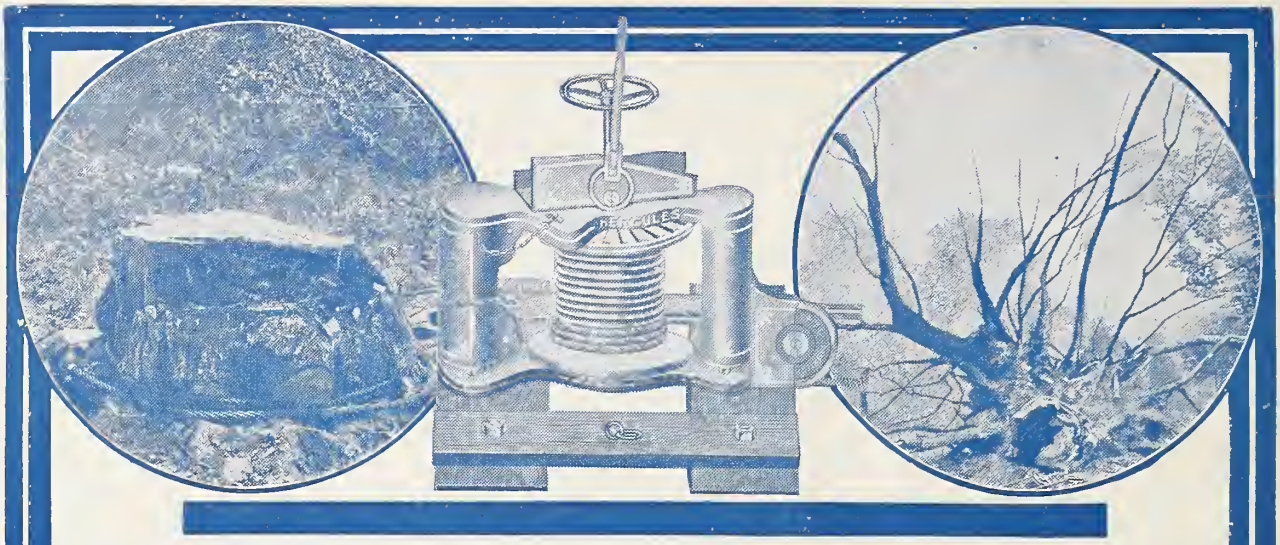
Whether we handle box, barrel or bulk apples it is our duty as distributors to back up our fellow Americans who produce this fruit in which we all have vital and permanent interests. Let us talk less of difficulties and more of the possibilities. The Export outlook may be dark now, yet without exports of any sort we could still consume the whole crop at home at a profit to all concerned. Where there is a will there is a way!

STEINHARDT & KELLY cannot buy all the apples in the United States, but they can buy quantities in keeping with their supplies of past years, and are doing so, and they can and are placing contracts judiciously to sustain and compensate those growers in all the famous districts who have worked hardest to establish and maintain the highest standards in quality, goods and pack.

Everybody Must Help

Let us all work together towards a constructive end! The 1914 apple deal may be no different from that of other years; it merely looks a little different now.

Buy apples! Buy good apples! Handle them skilfully, work to stimulate consumption, let them go at prices that will encourage use and give everybody a sure but moderate profit. If you do this the 1914 apple deal will eventually be a paying proposition for everybody concerned, grower, trade and public.



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You will see why and how the Hercules pulls any stump, green tree or hedge in five minutes or less—an acre or more of stumps a day—even if there are 100 to 200 stumps in the acre. The Hercules *has* done it—*is* doing it—for hundreds of other progressive farmers and it will do it for you.

4c Per Stump

Mr. E. C. Culbreath writes, that the cost of operating the Hercules is 4c per stump. That's certainly the cheapest way to pull out the stumps and make room for *money* crops! Why don't *you* get a Hercules now to pull out *your* stumps so you can raise crops?

What All Steel Means

The Hercules is the only *genuine* all Steel Puller made. There are *imitations* of steel, "semi steel," "Manganese Steel" and cast iron pullers. The Hercules is 400% stronger than them—and 60% lighter. Which will you have—the *genuine* steel—or an imitation that may break when you least expect it? Will you take chances on a machine breaking at the first strain—or will you make *sure* of a puller that *won't* break—that is *guaranteed* not to break?

What Triple Power Means

Hercules triple power means a greater pull than you can get out of a 100 H. P. traction engine. Think of it! Is it any wonder that the Hercules pulls biggest stumps like you pull *weeds!* And you can adjust the Hercules to make it single or double power also, giving you three machines in one.

30 Days Trial

I'll send you a Hercules to try for 30 days. See how it works. See how low-down it's built—how the double ratchets insure safety—how it is self anchored or stump anchored—how carefully it is turned and polished to lessen the draft. And see how easily it pulls up the biggest stump in your place.

3 Year Guarantee

I guarantee absolutely to replace any casting that breaks any time within three years whether it is your fault or the fault of the machine. I don't have any arguments as to whether the material or workmanship was defective. Simply send the broken casting back and I will send you a new part at once. That's all there is to my offer—it means just exactly what I say.

Get My Grand Hercules Book Free

Mail me the coupon below—or just a postal. I'll guarantee my book will interest you.

I have a special price offer to make to a few first buyers. Send me your name. I want you to get in on this proposition. You will never regret this move as long as you live. My book shows photos of big stumps, green trees and hedges the Hercules has pulled—shows letters from Hercules owners—proves the value and superiority of the Hercules in a hundred different ways.

All I want to do now is to get my offer and book into your hands at once. If you are troubled with stumpy land. I know you will see the fairness and profit there is for you in my offer. Simply mail me coupon or a postal.

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Gentlemen: Please send me all free books about the only All-Steel Triple-Power Stump Puller. Also your 30-day free trial and low-price-to-first-buyers proposition.

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